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WORLD AIR TRANSPORTATION

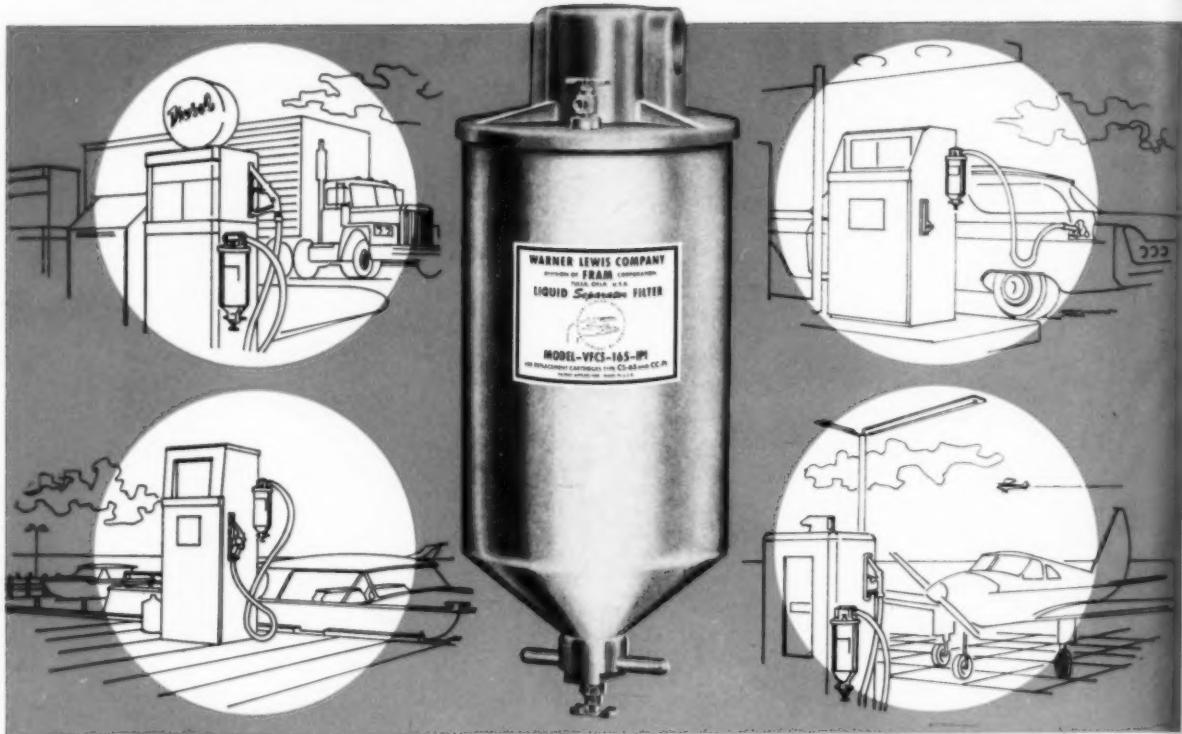
OCTOBER, 1961



**1st Annual
ACCESSORY
AND
GROUND
EQUIPMENT
BLUE BOOK
ISSUE**

Also in this issue:
Big Issues Are Facing IATA
Air Transport at Farnborough

PROTECTION



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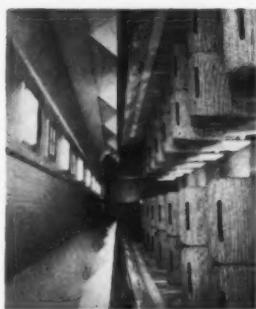
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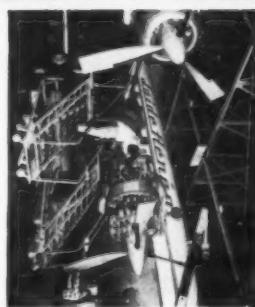
☆☆☆ We'd like to say this is crew lounge area — but it ain't!



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Preview of the new short-range Boeing 727



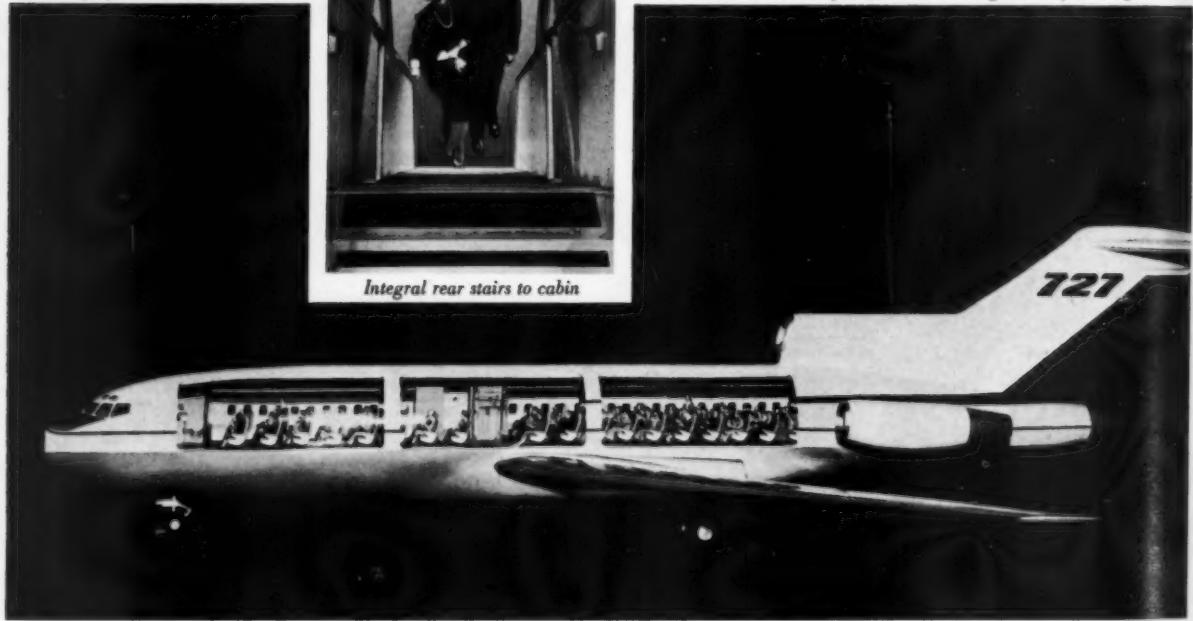
727 has 3 rear-mounted engines



Mock-up of 1st class cabin section



Wide 727 cabin permits 6-abreast high-density seating



Show above are photos of scale models and a full-size mock-up illustrating some of the outstanding features of the new Boeing 727 short-range jetliner.

Designed to produce an operating profit even at modest load factors, the 727 is a high-performance jet that will service 150- to 1700-mile routes, operating from 5000 foot runways with full payload.

The 727 brings airlines many short-route features, including quick takeoff, rapid climb to cruise altitude, low approach speed, the durability required for frequent takeoffs

and landings, and integral airborne stairs to help reduce ground time during short stops. Capacity ranges from 70 first-class to 113 tourist-class passengers, plus 850 cubic feet of heated and pressurized cargo space. Another unique 727 advantage is the incorporation of many systems and components proved out in more than 350,000,000 miles of Boeing jetliner operations.

Already, American Airlines, Eastern Air Lines, Lufthansa German Airlines and United Air Lines have ordered 117 Boeing 727s for delivery beginning late in 1963.

BOEING 727

AIRLIFT



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OCTOBER, 1961

airlift

WORLD AIR TRANSPORTATION

FEATURES

<i>Major Issues Peril IATA Unity</i>	16
<i>French Merger Is Brewing</i>	17
<i>Air Transport at Farnborough</i>	18
<i>What Project Horizon Hopes To Do</i>	25

THE INDUSTRY IN BRIEF

<i>Air Transport Trends</i>	11
<i>Industry at a Glance</i>	13

First Annual

Air Transport Accessory & Equipment

BLUE BOOK

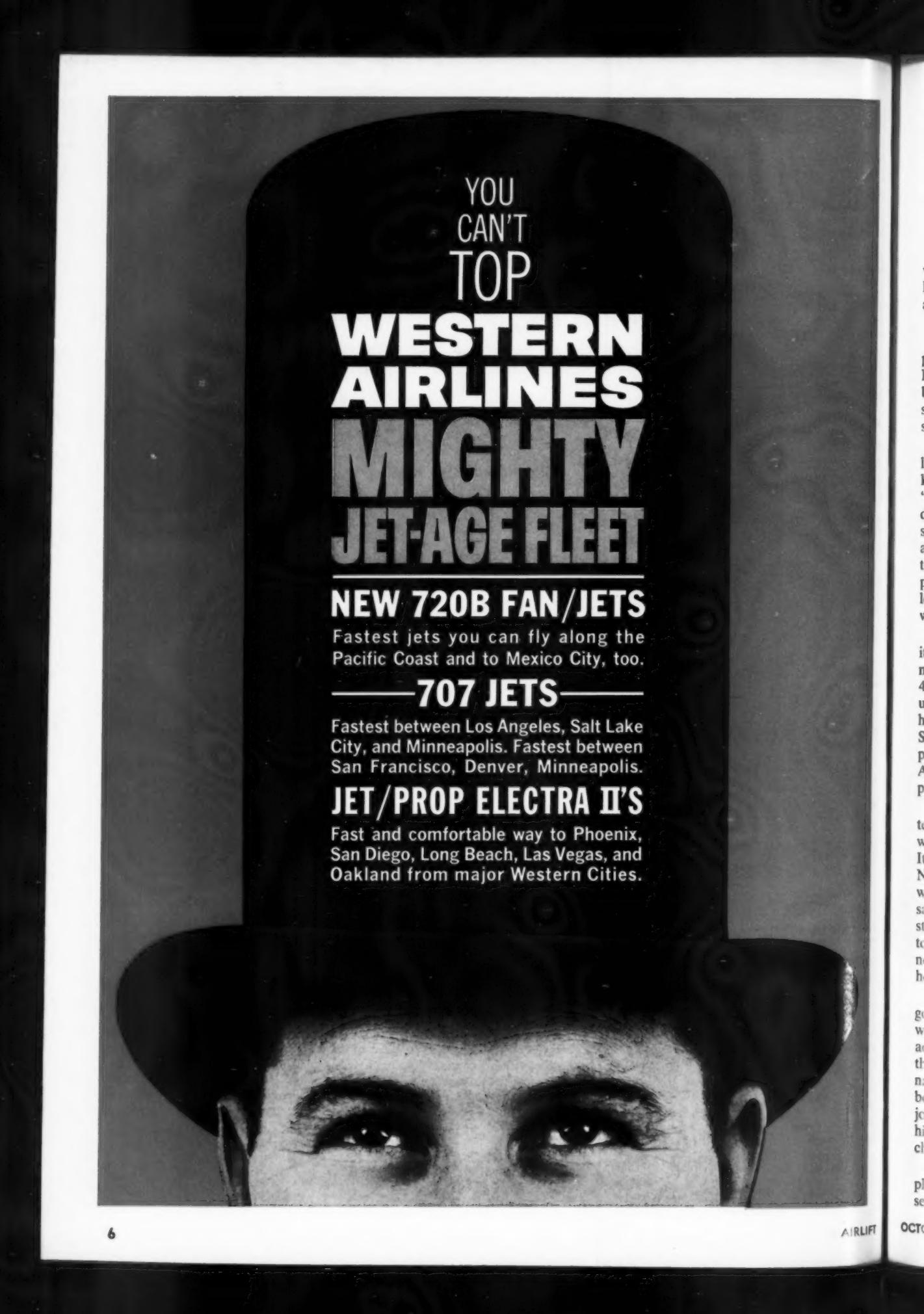
Contents	27
<i>What Airlines Want in Equipment</i>	29
<i>Let's End Airport Terminal Confusion</i>	76
<i>Blue Book Equipment Tables</i>	84
<i>Accessories</i> 32	<i>Ground Support</i> 56
<i>Maintenance & Overhaul</i> 65	<i>Airports</i> 81
<i>Air Traffic Control Equipment</i>	84

DEPARTMENTS

<i>Personal View</i> 7	<i>News Briefs</i> 98
<i>Letters</i> 9	<i>On Time Box-score</i> 102, 103
<i>Calendar</i> 9	<i>En Route</i> 104
<i>Airlifts</i> 85	

IN THIS ISSUE Airlift publishes its First Annual Air Transport Accessory & Equipment BLUE BOOK (See Special Contents, page 27). In future editions, it will feature the vast array of new items—black boxes, accessories, ground equipment and shop tools developed each year for air transport operators. Also don't miss: Robert Burkhardt's "inside story" of IATA's problems (p. 16); a roundup of air transport at Farnborough (p. 18); and Leigh Fisher's first provocative analysis of airport problems (p. 76).

21,000 copies this issue



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PERSONAL VIEW

Project Whizzitt

NO ONE can find much to quarrel about in the much-awaited Project Horizon report which was instigated last March with President Kennedy's blessing to set forth the U.S. national aviation goals for the period between now and 1970.

But there is a superficiality about the entire product. Depth and statesmanship are lacking. Hash can be very good or it can just be passable, but it is still hash, and Project Horizon is in essence a rather hasty re-write job which falls far short of what might have been produced.

After all, who can go wrong making such scintillatingly elementary textbook statements as: "A key to airline financial stability is earnings," or "Safe and efficient use of the airspace in high-density terminal areas should be carefully considered," or "New economical all-cargo aircraft and cargo-handling systems should be utilized to take full advantage of their cargo-price-reducing potential." A lot of the report is just plain, harmless rhetoric and most of it could have been written by one man on a weekend.

If Project Horizon is just another mish-mash, it would be unfair to place the blame on the chairman of the task force committee, the balding 48-year-old mentally spry and occupationally ubiquitous Frederick Marion Glass, who has just hopped from his skyscraper office in the Empire State Building to the lower-altitude but plusher precincts of the Hertz Corporation on Madison Avenue in New York where he is executive vice president.

If any blame can be assessed—and we don't intend to be splenetic or captious in so doing—it is with the very origin of Project Horizon last March. It was the brainchild of FAA Administrator Najeeb Halaby who soared into Washington with wings full of ideas. No bureaucrat is worth his salt unless he can authorize and direct a major study on some high-level subject. Without stopping to determine whether a study on aviation goals was needed, it was instituted because—well, why and how do these things get going?

The idea wasn't so bad, really, but once it got into action, Project Horizon became noteworthy for ignoring every bit of sound procedural advice given by seasoned citizens to the powers-that-be over the task force level. A lot of prestige names were added to an almost-unused advisory board. A small staff began to do a crash writing job and it is doubtful if any single staffer wants his identification with the finished product to be chiseled on his tombstone.

Quite apart from the almost endless number of platitudes and truisms which hardly constitute a set of national goals, there is no harm done and

some good may actually occur. Project Horizon is a sort of cicerone to the layman who just wants a broad picture painted of civil aviation matters. Industry people will welcome some items championing—although superficially—their problems, and some will welcome the boost given to supersonic transport. The international section could have been good but for some reason Project Horizon not only recommends that a detailed study be made, but then proceeds to make some specific observations which, if these are true, would make a further study useless. But of course a real international study is indeed needed and is to be carried out and this, among others, is one of the few tangibly constructive and meaningful specifics to come out of a routine compilation with a high-sounding title.

As we say, Project Horizon is on sound ground. It's against sin, and it's for home, mother and the flag. Industry will have to continue to find its own salvation.

Robert E. Gross

THE time comes to every writer when the appropriately expressive words fail to come forth. And such is the case in paying tribute to Robert Ellsworth Gross, the board chairman of Lockheed who died early last month at the age of 64. So permit us to quote from a truly moving editorial, "The Greatness to be Humble" in *The Lockheed Star*, one of the company's own publications.

"When Robert Gross died something within all of us died . . . For Robert Gross was part of all of us. He was part of Lockheed. He founded it, he built it, he sustained it. His strength became our strength. His vision became our vision. Those of us who knew him only by reputation admired him. Those of us who knew his warmth and spirit personally loved him . . .

"Robert Gross was a dreamer and a doer . . . He was, basically, a simple man. His strength came from his sure grasp of the simple virtues.

"'Our great task,' he said, 'is to guard in all this maelstrom of our scientific world the true values, the simple little acts of daily love and friendship, the readiness to share and help, the courage to speak the truth, and the greatness to be humble.'"

That last—the greatness to be humble—was surely the finest tribute that can be paid to Bob Gross. He was a fine man, a great man, who contributed very greatly to the development of aviation in this country and the world. He has left a legacy of service and honor. Along with a host of others, we shall miss him sorely.

Wayne W. Parish



The de Havilland TRIDENT

(Rolls-Royce Spey by-pass engines)

- The short-haul jet airliner for long-term planning
- The world's leading design for a second-generation jet
- The first three-jet conception
- The first civil aircraft engineered for automatic landing

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Air Travel and Autos

To the Editor:

Your "Personal View" compliment to Bananza Air Lines is endorsed on the various low excursion fares provided. However, many will deny themselves this bargain and drive because they "need their car at their destination." Allegheny's move in acquiring 50% interest in National Car Rental is seen as a probable solution to the larger problem of a complete transportation service, rather than diversification into a related field.

Anyone watching business travelers (and others) heading directly for the car rental counters at terminals, must foresee the time when this double "ticketing" is replaced by an inclusive system of air travel plus destination rental car at minimum cost by an airline automobile pool.

MR. R. F. DUNCUMB
Clevite Electronic Components
Inglewood, California

COMING

October

- Oct. 2-4—IRE, Canadian electronics conference, Automotive Bldg., Toronto.
- Oct. 3-5—1961 National Airports Conference, University of Oklahoma, Norman, Okla.
- Oct. 3-5—ATA, stores and material planning committee, Forest Hills Inn, Forest Hills, Long Island, N.Y.
- Oct. 5—International Airline Navigators Council, Pacific regional meeting, San Francisco.
- Oct. 8-10—International Northwest Aviation Council, 25th annual convention, Spokane.
- Oct. 9-11—Airport Operators Council, mid-year conference, Hilton Hotel, El Paso.
- Oct. 9-11—IRE, national electronics conference, Int'l Amphitheatre, Chicago.
- Oct. 10-12—ALDA, nineteenth convention, Miami Beach.
- Oct. 15-18—Cessna Aircraft Co., annual international sales meeting, Miami Beach.
- Oct. 19—IATA, executive committee, Sydney, Australia.
- Oct. 22-24—International Airline Navigators Council, European regional meeting, Paris.
- Oct. 23-25—East Coast Conference on Aerospace & Navigational Electronics, Lord Baltimore Hotel, Baltimore.
- Oct. 23-27—IATA, 17th annual general meeting, Sydney, Australia.
- Oct. 24-26—ATA, engineering & maintenance conference, Miami Beach.
- Oct. 24-26—Air Traffic Conference, fall meeting, Marriott Twin Bridge Motor Hotel, Wash., D.C.
- Oct. 25-27—Southeastern Airport Managers' Assn., 15th annual meeting, Monroe, La.
- Oct. 25-27—Assn. of Local Transport Airlines, quarterly meeting, Sahara Hotel, Las Vegas.
- Oct. 30-31—Vickers Hydraulic Conference, Pickford Shelby Hotel, Detroit.
- Oct. 31-Nov. 1—ATCA, 6th annual conference & electronics information center, Miami Beach.

November

- Nov. 3—Connecticut General Life Insurance Co. symposium on the issues and challenges of air transportation, Hartford, Conn.
- Nov. 17—Annual Institute on Air Transport Management, the American University, Wash., D.C.
- Nov. 18-19—Flight Safety Foundation, 14th annual international air safety seminar, Naples, Italy.
- Nov. 21-26—ATA, purchasing committee meeting, Park Sheraton Hotel, New York.
- Nov. 22-Dec. 1—ASME, annual winter meeting, Statler Hotel, New York.

December

- Dec. 1—(Tentative) FAA, supersonic transport airworthiness conference, Wash., D.C.
- Dec. 17—National Aviation Trades Assn., annual meeting, Statler Hotel, Wash., D.C.

Viscount Statistics

To the Editor:

I have been receiving your monthly journal regularly. Not only is it an education to go through the various economic aspects covered but the articles are so interesting and relevant that I actually look forward to receiving my monthly copy. I get dozens of other aviation publications which I can only hurriedly go through for want of time, but *AIRLIFT* is one where I cannot take such a chance as almost every page is worth reading. My line being costing and finance, your comparative costs are just the thing for me.

I congratulate you on the get up and the usefulness of your publication.

My regret, however, is that it contains very little information on the operating economies of airlines other than in the U.S. Perhaps you are unable to get their figures in time. For example, I wish you can publish the Viscount operating costs of the Indian Airlines along with those of the American operators. The comparison will, I am sure, be quite revealing to many, in many parts of the world.

J. S. PARAKH
Financial Comptroller
Indian Airlines
New Delhi, India

ALPA's Job Agency

To the Editor:

In Mr. Parrish's "Personal View" of September, 1961, he states the ALPA should admit they lost the Southern Airways strike and find jobs for their men.

The ALPA doesn't seem to be doing too bad in that little chore and they have absolutely no scruples in finding work for their, so called, men.

The unapproachable ALPA has stolen my job as well as the jobs of 60 other 15 to 20 year men at Northwest Airlines. They have stolen the jobs of 110 men on Western Airlines and the jobs of about 20 men at Continental Airlines.

F. A. ROWORTH
Bellevue, Washington

Transatlantic Squeeze

To the Editor:

Just a note to congratulate you on the July *AIRLIFT* editorial "Transatlantic Squeeze." We certainly would hope that a more realistic appraisal would tend toward a more realistic attitude. This is all the more true since the carriers as members of IATA protest that the basic fare level is inviolable and yet offer enormous capacity with jet equipment in the peak season on a charter basis at an average of \$200 a passenger.

WARREN E. KRAMER
First Vice President
Scandinavian Airlines System
Jamaica, New York

More Africa Comments

To the Editor:

"En route" in the July *AIRLIFT* is a sensible and fair essay on a situation that has been much confused by do-gooders and bleeding hearts.

ROBERT FORD
Jackson Heights, New York

Helicopters

To the Editor:

Your piece about Helicopters in the recent issue of *AIRLIFT* makes good sense, is well put together, and should be helpful to the cause.

It is quite evident, as you say, that this machine is not arriving any too soon, and that we have our work cut out for us in putting it over on the "Hill."

In the overall picture, though, I believe our group has laid the foundation, at reasonable cost and with a creditable performance record, for something that could spark a real move toward supplying the answer to that gap in our total communications system. Who knows? It might even already be the "third level" and all we have to do is tell about it.

C. M. BELINN, President
Los Angeles Airways, Inc.

ALPA and FEIA

To the Editor:

In the September issue I read with a great deal of interest (Page 7) "Costly Cause" and want to say that I don't believe a public relations expert can help the cause. There are too many underhanded and sneaky tricks pulled by the ALPA to be so easily forgotten. The strike with Southern is lost. They also lost with National right after W.W. II. National has just signed a new contract with the FEIA and has made the statement they prefer men with A&P licenses rather than pilots' licenses.

ALPA forced management to put the extra pilot on jets. The Feinsinger Committee called this an "error of negotiation." Now they are attempting to force out the professional flight engineer and put the extra pilot in his job.

If all the large airlines really wanted this they would have done it years ago. They have found the pilot-engineer does not contribute anything to the operation in the way of preventive maintenance and that the jets are beginning to wear, have mechanical, electrical, hydraulic and engine troubles that require an engineer with a little more "know how" than how to operate the flight controls.

Frankly, I think they have lost their battle against the FEIA. Pilots are just labor, they work for a wage and drive airplanes, it's that simple.

DAN E. WARREN
San Bruno, Calif.

Air Delivery to Europe

Meeting the growing demand of our international readership, *AIRLIFT* is now being air-shipped to Amsterdam each month for further redistribution to key European cities. The new, fast delivery began with the January issue at no additional cost to European subscribers.

BRIEFING

Texaco reports on Local Airline Service for business and pleasure



Unusual vacations for the time-conscious



ALASKA offers an amazing variety of vacation possibilities — ranging from watching seals to panning for gold.

are a specialty of the Intra-Alaskan Lines

Vacationers pressed for time, yet with a yen to do "something different" should take a close look at what many of the Intra-Alaskan Lines have to offer.

For example, travelers actually pan for gold north of the Arctic Circle on Wien Alaska's "Polar Sea" tour. Cordova Airlines also fly modern day gold seekers to the "Klondike" on their Dawson City Sourdough Tours. And amateur naturalists can watch the annual seal migration first-hand—if they get to the Pribilofs via Reeve Aleutian Airlines during July and August.

Local carriers test downtown air service

Businessmen in a hurry may soon be able to take-off and land almost outside their downtown offices—if experiments now underway by several local carriers prove out.

Allegheny Airlines kicked off its experiment with an application to the CAB for scheduled helicopter service in the Washington-Baltimore area. Allegheny plans take-off and landing points in downtown Washington and at four local airports.

Lake Central Airlines is currently testing the Vertol 107 (Vertical Take-Off and Landing Aircraft) in both intra-city and downtown to downtown flights. Cities getting the benefit of this experiment are: Washington, Pittsburgh, Cleveland, Detroit, Toledo, Dayton, Indianapolis, Lafayette and Chicago.

Ellis Air Lines in Alaska already offers its own kind of downtown to downtown air service. Ellis sidestepped the problem of lack of airfields by landing passengers on the water right in front of their destinations.



VERTOL 107, built by Vertol Division, Boeing Co., carries 25 passengers, or 8½ tons of freight, at 155 mph. cruising speed.

Switch to air freight enables one firm to scrap warehousing... save \$360,000 a year

Local carrier freight service makes "all the way by air" delivery possible. Air freight may be stirring up a quiet revolution in warehousing. An indication is the recent move by one of the nation's biggest electronics firms to scrap its entire warehouse system in favor of a single central supply depot — shipping 100% by air. • Results are eye-opening. Inventory is down \$2 million. Operating expenses slashed by \$360,000 a tributors can expect delivery within 48 hours after efficient local airline freight service makes this "all the way by air" delivery possible. Last year, local carriers flew a whooping 5½ million tons of cargo in and out of 564 cities—a tonnage increase of 200% over 1950. • Local service airlines are now girding for an even bigger expansion in the 60's. New Convairs just bought by Trans-Texas Airways, for example, will triple the cargo-carrying capacity of just one line.



HUGE ALL-CARGO PLANES boost air freight efficiency and economy. General Dynamics all cargo CANADAIR 44, shown here, flies 65,000 lbs. at 400 mph. Unique hinged tail permits fast "straight-in" loading.

Information on how local airlines contribute to America's business growth... prepared by Texaco Inc., Aviation Sales Department, 135 East 42nd Street, New York 17, New York.



ROSTER OF LOCAL SERVICE AIRLINES: (Domestic) Allegheny • Bonanza • Central • Frontier • Lake Central • Mohawk • North Central • Clark • Pacific • Piedmont • Southern • Trans-Texas • West Coast • (Intra-Hawaiian) Aloha • (Intra-Alaska) Alaska • Alaska Coastal • Cordova • Ellis • Northern Consolidated • Reeve Aleutian • Wien • (International) Caribbean.

AIR TRANSPORT TRENDS



Equipment

TWA Caravelle order has far-reaching significance. It represents 50% penetration by Sud Aviation of U.S. "Big Four," a factor that is certain to influence smaller carrier decisions. It also marks a further breakdown in resistance to buying non-U.S. transports. Eight U.S. passenger or cargo carriers are operating or buying British, Canadian or French aircraft. Also, nine locals, Alaskan or Hawaiian carriers operate U.S.-built transports powered by British engines.

Cargo

Canadair will build 10 CL-44 turboprop freighters on speculation. Manufacturer now has firm orders for 17. The Flying Tiger Line, with 10 on order, is seeking financing to buy five more.

FAA

There's growing unrest in FAA's ranks. Reason: inactivity. While Administrator Halaby and top aides are working 16-hour days, highly paid staffs have been idle for months awaiting direction, leadership and the results of Project Horizon and Project Beacon.

Air Shuttle

"Air shuttle" idea may spread to Europe. British European Airways is considering London-Glasgow service patterned after Eastern's New York-Washington and New York-Boston flights. High-density Vanguards would be used in effort to eliminate need for standby aircraft.

Traffic

Airfreight's 1961 gain in U.S. is now expected to be almost 15%. August shipments were 18.9% ahead of last year. Outlook for the rest of the year is good.

Automation

Mechanized loading systems are catching on. Next big carrier to make a move (Pan Am adopted Douglas system recently) will be American. Development contract for AA's system reportedly will go to a newcomer in airline cargo equipment field. British European Airways will assume leadership in automation in November when it introduces AW 650 Argosy with Rolamat cargo loading system. Riddle Airlines is using a hybrid version of this system in its Argosy Logair operations in U.S.

New Services

Interest in "third level" air service in the U.S. is growing. CAB now has four applications from operators in Kansas, Illinois, Louisiana and Alabama. They would use smaller planes to serve stops abandoned by locals and other small towns that can't support DC-3-or-better service. National Aviation Trades Assn. wants CAB to call an industry conference to establish a framework for third level of carriers. Only application granted expedited hearing by CAB is Hi-Plains Airways, Kansas, tentatively set for Dec. 5. Board feels midwest may be best area for this type of service, also hopes hearing will produce aircraft operating cost figures that will help it in other cases.

IATA

Manufacturers are confused about this month's meeting in Sydney. Last year, they were banned from area of annual meeting. However, Australians have told them they're welcome in Sydney, but because of IATA secretariat, they won't be invited to official functions. This has caused confusion among U.S. and British companies. Outcome probably will be that top brass won't attend, but lower echelon people may be sent in case the competition shows up.

Sundstrand e-x-p-a-n-d-s jet start capabilities

— Sundstrand's new Cartridge-Pneumatic Starter has been accepted by USAF for use on B-52H and F-100 aircraft. This new starter, now in production, offers complete self-containment and three-mode starting:

- Cartridge
- Pneumatic start using compressed air from ground power cart
- Cross-bleed start from idling engine

— The new Sundstrand Starter-Drive recently approved for the Boeing 727 has been phased into production. It combines the two functions of engine starting and transmission of power to a constant frequency 400-cycle a-c electrical generator, in a single lightweight unit. This dual-purpose "power package" offers two more starting modes:

- Electric starting from a single 400-cycle ground power source (which also provides standby power)
- Electric cross starting from an idling engine

— For the *ultimate* in dispatching reliability, a Cartridge-Pneumatic Starter can be used with the Starter-Drive system. This combination offers maximum flexibility and positive starting insurance under all operating conditions. Enables starting by:

- Pneumatic or electric ground power
- Cross-bleed air
- The cartridge mode for emergency or complete self-contained starting

— *Regardless of type of aircraft—jet, STOL, commercial or military . . . or operating conditions—poorly equipped fields, scramble starts, or maximum reliability requirements . . . Sundstrand has the R&D and hardware production capabilities to handle your specific starting and constant speed drive needs.* Write or call your nearest Sundstrand Aviation office for complete information on system evaluations, reliability factors, production scheduling, and initial, operating, and maintenance costs.



SUNDSTRAND AVIATION

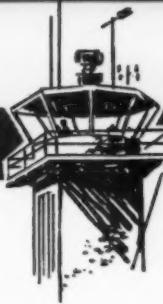
DIVISION OF SUNDSTRAND CORPORATION, ROCKFORD, ILLINOIS

... leader in secondary power systems

Facilities In: Rockford, Illinois; Denver, Colorado; Pacoima, California—District Offices In:
Arlington, Texas; Hawthorne, California; Dayton, Ohio; Seattle, Washington; Stamford, Connecticut; Washington, D.C.



INDUSTRY AT A GLANCE



EQUIPMENT

Caravelles for TWA—After months of negotiation, TWA ordered 20 General Electric-powered Caravelles from Sud Aviation and optioned 15 more. Price, including spare engines and parts, will be almost \$100 million.

The French-built aircraft, designated Caravelle 10A, will be powered by GE CJ805-23C aftfan jet engines. Financing arrangements, with airframes and engines being purchased separately, were not yet completed when the order was announced.

Sud Aviation will build the planes at Toulouse, and Douglas Aircraft, U.S. service representative for Sud, will supply spares after sale. Deliveries start in January 1963, and will be completed the following July. Passenger capacity ranges from 68 first-class to 85 tourist. United Air Lines was the first to put the French twin-jet into operation in the U.S.

Meanwhile, Douglas has sold three Caravelles to Aerolineas Argentinas, which also optioned three. First plane will be delivered next December, and the other two in 1962. Powerplant is the Rolls-Royce Avon Mark 531.

ROUTES

CPAL to London—Canadian Pacific Air Lines, operator of routes in the Pacific, South America and to four European points—as well as limited trans-continental service in Canada—has received another major award: a route from western Canada to London.

The route, awarded by the Canadian government under terms of the Canada-United Kingdom bilateral, is designated Vancouver/Edmonton/Gander-London. Subject to approval of the British, Vancouver-based CPAL starts service Oct. 6, using mixed-class DC-8s and Britannias. Winter schedule calls for two round-trips weekly, plus one on the present route to Amsterdam.

Government-owned Trans-Canada now serves London from Montreal, and also flies to European points. In addition to Amsterdam, privately-owned CTAL has a segment from Montreal to Lisbon, Madrid and Rome.

Ansett-ANA to Darwin—Ansett-ANA, which proudly bills itself as "Australia's free enterprise airline," won a major victory: After several earlier refusals, the coordinator of the Airlines Rationalizing Committee granted the company access to Darwin. Service starts Oct. 15.

Previously, Darwin was a closed preserve of

government-owned Trans-Australia Airlines. The decision puts Reginald Ansett's airline in direct competition with TAA on all capital city routes.

New route for Pan Am—A route from Miami/Tampa to Mexico City with a mandatory stop at Merida, Mexico has been awarded to Pan American World Airways by CAB.

Pan Am was selected over Eastern or National because "only Pan American will suffer significant diversion if another carrier is awarded the route," said CAB. It also noted that beyond-terminal benefits will be much greater if the service is operated as part of the Pan Am system.

FREIGHT

No floor under freight rates—CAB has decided that it will no longer dictate minimum airfreight rates. Lower freight charges are expected to result, but CAB's warning that it will not allow rates to fall below economic levels precludes a rate war.

Three factors were "crucial" to the Board's decision: (1) basic conditions (a rate war) which led to establishment of minimum rates in 1948 no longer exist, (2) stabilization of rates over a period of years, (3) impending technological improvements in the industry accompanied by a continued expansion in capacity.

Carriers will now file tariffs, which CAB can suspend or investigate upon complaint or upon its own initiative. With introduction of new turbine freighters and big capacity increases, industry needs maximum flexibility and opportunity to experiment with promotional rates, CAB reasons.

"There is on the horizon the prospect of a breakthrough in the air transportation of freight which will enable the carriers to achieve profitable freight operations for the first time," it notes.

PROMOTION

Smart sales promotion—With its fleet of nearly 200 planes slated to be out of service for 12 hours on Oct. 14-15 during the military's Operation Skyshield, American Airlines will put the grounded equipment to work for the sales department. It is inviting the public to a nationwide "open house" inspection of the fleet.

AA employees, many of whom will be freed from usual duties during Skyshield, will serve as guides for persons walking through the jets and other planes at airports where they will be grounded.

Skyshield, which will ground all but military craft, lasts from 1 p.m. EDT Oct. 14 to 1 a.m. Oct. 15.



ON WET OR DRY

SAFER JET TIRES

Proven safer traction, longer tread life.



WORLD'S FASTEST "RUNWAY" for advanced testing of aircraft tires is Goodyear's new multistage dynamometer system. First to simulate most accurately all tire operating conditions, system qualifies tires up to 320 mph, and advanced testing at 500 mph. Today it's checking out designs for 1970's tires.

If they're Goodyear tires, they're engineered to withstand higher loads and hotter temperatures for longer periods, to give the best over-all performance time after time. Whether the challenge is a 225-mph-takeoff requirement, or an extended taxi run under load, or the abusive high impact of a Navy carrier landing, Goodyear tires deliver performance beyond requirements. And the extra margin of reliability they provide in high-speed service, plus their longer tread and carcass life, is the plus value Goodyear tires deliver.

Five major reasons account for Goodyear's commanding position in aircraft tires:

1. Continuous rib treads truly engineered to deliver the ideal grip/tire and stopping-power combination under both wet and dry runway conditions.

2. Tread design provides a "built-in" obvious and proven reliable wear indicator. When any portion of the groove disappears, tire change is indicated.

3. Most advanced research, development, testing and quality control facilities in the world.



OF DRY RUNWAYS...

LANDINGS

on proven safer impact reliability

Unrivaled record of performance on all types of high-speed commercial and military planes.

Largest staff of expert aviation tire consultants, available for on-the-spot service everywhere.

Today Goodyear is fully capable

of meeting *all* requirements for a "built-in" aircraft tires—for the

jet aircraft flying now and tomorrow. Call your nearest Goodyear field office for complete details. Or write on company letterhead to The Goodyear Tire & Rubber Company, Aviation Products Division, Dept. J-1735, Akron 16, Ohio. Remember—lots of good things come from Goodyear.



PROVEN RIB TREAD PATTERN gives optimum tire coefficient of friction—optimum tread wear and reliability. Three center grooves "pump" runway clear of water, let tire grip practically dry runway, rain or shine. Wide outer ribs resist excessive tread wear and surface cutting. Shoulder grooves supplement center grooves, maintaining a high coefficient of friction throughout tread life.

GOOD YEAR

Major Issues Threaten IATA Unity

Enforcement breakdown under pressures of excess jet capacity is a major concern. Small carrier representation is another

By ROBERT BURKHARDT

IT WILL BE SPRING, Down Under, when members of the International Air Transport Assn. meet later this month in Sydney, Australia, for their 17th annual get-together, but the season may prove the only cause for gladness.

IATA as an organization is torn by internal problems that threaten its future unity. Members know it and they are worried. One basic weakness is enforcement, but there are other equally serious problems. Example: the matter of small carrier representation at policy-making levels in IATA.

In enforcement, the breakdown is so serious that some of the world's major airlines are turning to their governments to help hold the fares in line. The great surplus of capacity resulting from over-indulgence in jet buying is causing widespread discounting of tariffs, both passenger and freight. Today there are few places in the world where a passenger who shops around can fail to get a discount or reduction of some sort.

"Marmalade" is the ticket agent's term for under-counter discounts, rebates, currency adjustments—all the tricks and turns that add up to the sale of a ticket at less than the published price.

All of South America and most of the Middle East contain trouble spots. After a disappointing summer on the North Atlantic, discounting is beginning to show along New York's Fifth Avenue. So far, the IATA enforcement machinery has been unable to cope with it.

SUCCESSION OF MEMBERSHIP IATA'S EXECUTIVE COMMITTEE

	'54	'55	'56	'57	'58	'59	'60	'61	'62	'63
PAA	X	X	X	X	X	X	X	X	X	
TWA	X	X	X	X	X	X	X	X	X	X
QANTAS ..	X	X	X	X	X	X	X	X	X	X
BOAC	X	X	X	X	X	X	X	X	X	
BEA	X	X	X	X	X	X	X	X	X	
TCA	X	X	X	X	X	X	X	X	X	X
SAA	X	X	X	X	X	X	X	X	X	
SABENA ..	X	X	X	X	X	X	X	X	X	X
KLM	X	X	X	X	X	X	X	X	X	X
AF	X	X	X	X	X	X	X	X*	X	X
SWISSAIR ..	X	X	X	X	X	X	X	X	X	X
SAS	X	X	X	X	X	X	X	X**	X	
AIR INDIA ..	X	X	X	X	X	X	X	X	X	
AVIANCA ..	X	X	X	X	X	X	X	X	X	
NWA	X	X	X	X	X	X	X	X	X	
BNF					X	X	X	X	X	
TEAL	X	X	X							
LAI	X	X	X							
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PANAIR ..										
D. B.	X									
LAI	X	X								
JAPAN										
A. L ...			X	X	X	X	X***	X	X	

* Air France suggests Louis Lesieux, managing director to replace the late Max Hymans.

** Abe Rusck is no longer president of SAS. Substitute to be determined.

*** Japan Air Lines suggests Kambu Ishikawa to replace S. Yanagita. △ Memberships which expire this year.

Just a year ago, for example, the IATA Breaches Commission met in Paris to consider complaints and evidence of fare cutting made against member carriers. The situation was so acute that Sir William Hildred, Director General of IATA, took a hand himself. Referring to South America, he said, "it would appear that every IATA member operating the South Atlantic routes participated in it."

More in sorrow than in anger, he told the Breaches Commission that "any financial penalty . . . would be derisory in comparison with the losses members have already inflicted on themselves." At his suggestion, only one case against each airline was presented. Then the Commission solemnly, and in great secrecy, voted a "reprimand" for each airline.

There is some question whether the reprimands were taken to heart. At a Breaches Commission held in New York earlier this year, Panair do Brasil was fined \$20,000 for a 10% discount given on a Rio-to-Lisbon roundtrip ticket. For a 20% discount on a similar ticket, Aerolineas Argentinas also was fined \$20,000.

More fines and bigger

About the only solace to be gleaned from IATA's attempt to cope with fare wars is that more airlines are being fined and the individual fines are getting larger. Now about one fourth of IATA's income comes from fines. In 1960 this amounted to about \$350,000. Since enforcement costs about \$250,000 a year, the more rule-abiding members might seem to gain a small sum at the expense of the violators.

This is not necessarily the case, however. During last year's annual meeting at Copenhagen, Sheikh Najib Alumuddin of Middle East Airlines pressed for an increase in the \$25,000 ceiling for a single fine.

He reported that a comparative study of a member known to be "clean" and one which was "not so clean" showed that their total fines were much the same. Too much time, he said, is spent investigating student certificates and the like. If enforcement is to get at the root of the trouble, there should be higher fines and some form of appeal machinery. If matters don't improve, he said, there is doubt whether there is need for enforcement at all.

But the fact is, as every IATA member knows, if there is no enforcement, there is no IATA. More than half of the 400-odd air bilaterals now existing among 65 countries refer to IATA as the officially recognized rate-making agency. If IATA can't control rates, the governments will have to do it themselves. In the U.S., the Civil Aeronautics Board makes no secret of its belief that it could do better than IATA.

One measure of the seriousness of IATA's enforcement breakdown is the recent action of Pan American asking the CAB to take over enforcement of fares and rates by making adherence to these a condition to holding a foreign air carrier permit. In the pending renewal of the permit of Aerolineas Argentinas, Pan American pointed out that its South American losses had increased from \$1.9 million

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in 1957 to \$11 million last year. Losses by other U.S. carriers operating in South America last year totaled \$2.8 million.

Pan American said a large part of these losses was due to "uneconomic rate reductions either in filed tariffs or in violations of such magnitude that there could be no question but what they disrupted the entire air transport market." The CAB, said Pan American, should renew foreign air carrier permits only if a new clause is added which would permit the U.S. to cancel or suspend the permit if it found the airline selling tickets "at a substantial departure" from published tariffs.

In cases so far decided this year, the Board has rejected Pan American's request. If IATA is unable to regain control over enforcement, either by a major increase in the amount of each fine levied for a breach of the fares, or through better enforcement methods, the CAB may be forced to take some direct action to enforce the published tariffs for service to and from the U.S.

Although it is not on the agenda, enforcement will come up before the Sydney general meeting. An increase will be sought for the maximum fine which can be imposed for fare violations. What Sir William is anxious to sidestep is the touchy subject of how good the investigative work of IATA really is. In the past he has consistently refused to recognize that IATA enforcement penalizes the small airlines much more than the larger.

One error in 2000

At the New York Breaches commission, for example, IATA agents presented three cases of cargo violations against SAS. The carrier admitted to them, but pointed out that to dig out these three errors, IATA agents studied 6000 waybills covering nearly three years' shipments. All amounted to nothing more than failure to apply proper commodity classes to shipments. Ignoring the fact that SAS' record of error was near-perfect, a \$500 fine was levied.

At the same sitting, Sabena was fined \$15,000 for a 3.8% discount on a Cairo-New York ticket—actually the act of an agent trying to make a sale by rebating part of his commission. And the same IATA agents who plodded through SAS's waybills also dredged through 5000 of Swissair's. Finding: one violation. For this, Swissair was fined \$1000.

Because of growing distaste for the way the big airlines are running IATA, the potentially explosive issue of small airline representation is expected to be raised from the floor at Sydney. It came up last year purely as a question from Central African Airways' managing director, Max Stuart-Shaw: "Could any member propose a nominee for a seat on the IATA executive committee?"

Sir William gave an off-hand, affirmative answer. This was later amplified in correspondence between the Irish-born manager of the small African airline and the English chieftain of IATA.

Although this literary exchange reportedly contains some of the best English-Irish writing since the late George Bernard Shaw put down his pen, the letters have never been made public. Some who have seen them hope they will someday be published. Space does not permit their reproduction here in full, but the essence of the matter was expressed this way by Mr. Stuart-Shaw: "In actual fact, the General Meeting is asked only to confirm the nominations made by the Executive Committee and, inexperienced though I am in such matters, this does seem to me to be an undemocratic method of electing the Executive Committee which governs the affairs of IATA."

Add Mr. Stuart-Shaw, "It has been noted, also, that the

Traffic Advisory Committee membership is composed very largely of representatives of airlines which also have membership on the Executive Committee. On the face of it, an outsider might be forgiven for feeling that there is something of a 'closed shop' atmosphere." (See table on membership of executive committee.)

This issue is a very lively one with the smaller members. Mr. Stuart-Shaw was the only small carrier representative with the courage to question the Director General on the nominating system, which makes it abundantly clear that the membership is not based on individual worth—though many of the best men in the airline industry have served on the IATA Executive Committee—but on the "rights" of the big carriers to each have a place at the table. He was not the only one, though, to raise another "small airline" complaint: the summary dismissal of John Brancker as Traffic Director. Mr. Brancker was known as one of the few members of the IATA secretariat who would stand up to Sir William on the issue of small carrier rights.

The issue will probably get its biggest test at Sydney. At least one nominee not picked by the Executive Committee (Seaboard World Airlines' president Richard M. Jackson) has been submitted to fill an upcoming vacancy. As a follow up to his "letters," Mr. Stuart-Shaw is expected to propose another.

For their part, the Executive Committee gives every indication of renominating the list of incumbents to fill each of the regular vacancies which now exist.

There will be eight nominees for six posts. This means balloting, perhaps speeches, and a division among members on an issue far more important than the individuals involved.

The big question is: will IATA meet the challenge of the times, take action to prevent an enforcement breakdown, correct the arbitrary imposition of fines and, increase the representation of smaller airlines? Or will the delegates again merely rubber stamp a "status quo" in IATA in favor of enjoying the Spring weather in Sydney and the hospitality of the hosts Down Under? ■

French Merger Is Brewing

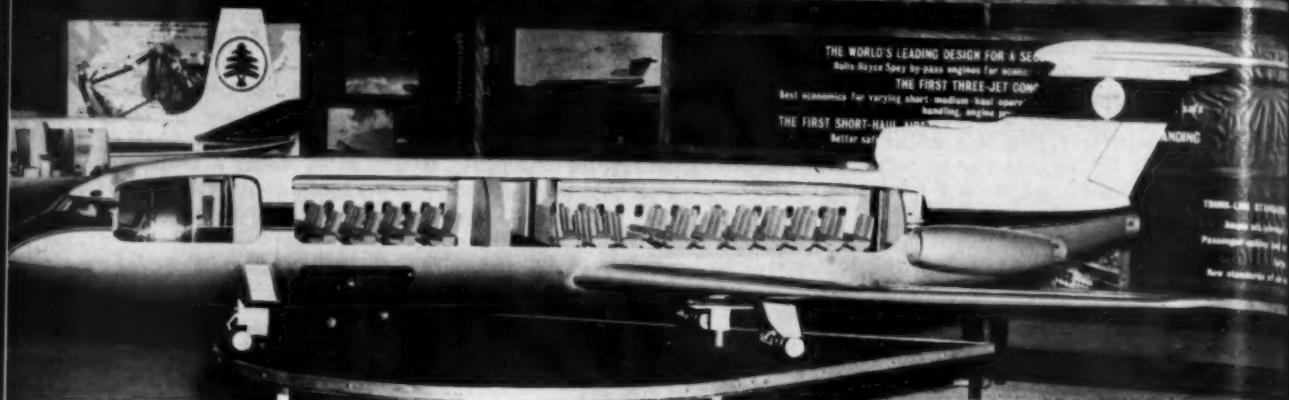
FRANCE'S TWO MAJOR INDEPENDENTS, TAI (Compagnie des Transports Aériens Intercontinentaux) and UAT (Union Aeromaritime de Transport) have agreed in principle to merge. Both boards of directors have approved the step. It will take about two years to consummate it.

As a start, two members of TAI's board have been named to the board of UAT and vice versa. A steering committee will supervise both airlines, consisting of the presidents and chairmen of the two carriers presided over by F. Fabre, chairman of Compagnie de Chargeurs Réunis, French shipping firm which holds substantial interest in UAT.

TAI and UAT will have a combined fleet of 39 aircraft including five DC-8s (TAI—3, UAT—2), two DC-7Cs, 15 DC-6s, six DC-4s, six DC-3s and six deH Herons. Their network includes 100 stops in 41 countries. Total employment is 5300. In 1960, they carried a combined 310,000 passengers, 15,500 tons of cargo and 11,327 tons of mail. In IATA, the merged TAI-UAT will rank 20th in size. ■

D COMET | The medium-sized airliner that is profitable in all its

DE HAVILLAND TRIDENT | The short-haul jet airliner for



CUTAWAY OF THE TRIDENT. De Havilland three-jet transport will fly before year-end and promises to pioneer all-weather

operations on routes of British European Airways come 1964. A developed version is being considered to improve sales potential.

Air Transport at Farnborough

By JOSEPH S. MURPHY
At Farnborough

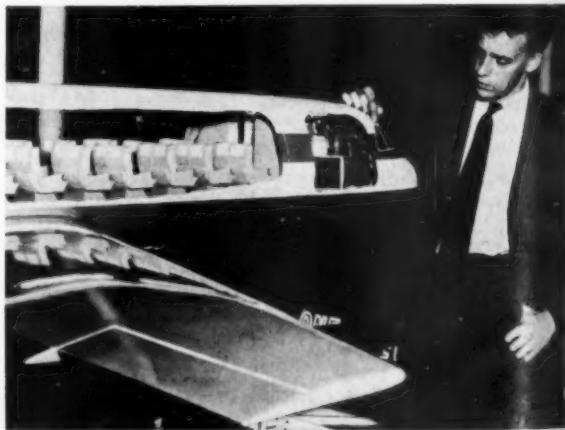
BRITAIN'S AIR TRANSPORT BUILDERS made their annual pilgrimage to the big tent at Farnborough this September, but the theme of their exhibits and the tone of their sales pitches carried one message—"Wait 'til next year."

This was strictly an "off" year for transports at Farnborough, but an "on" year to talk about what's coming up. Despite a total absence of first showings of airline aircraft, attendance by executives of carriers the world over was strong. Some 35 stemmed from the U.S. alone, many from the local carriers lured by Britain's wealth of development effort in the short/medium turbine field.

Ironically, the one big announcement timed for the SBAC show was not in this category, but fell to Britain's



OVERSEEING Hawker-Siddeley stable of transports are Brian Hough, sales mgr. (L) and C. A. G. Hicks, publicity mgr. (R).



VICKERS sales publicity manager Bob Blackburn points up cockpit visibility featured in upcoming twin-jet BAC-111.

biggest jet, the Vickers VC-10. An initial RAF order for five eased considerably the financing of a heretofore purely commercial program for British Aircraft Corp. It is almost a foregone conclusion that the RAF will order more.

But despite the absence of a "Farnborough order," interest in the smaller jets and turboprops predominated. Here's what they had to talk about:

de Havilland Trident—Now out of the hangar at Hatfield, the DH-121 will fly before the year-end and will be a big attraction for Farnborough 1962. Powered by three Rolls-Royce RB-163 Spey by-pass jets (9,850 lbs. thrust), it will carry from 70 to 100 passengers and enters service with British European Airways in 1963. Orders stand at 24, all BEA, but a longer-range version may be made available by 1966 to enhance its sales potential.

BAC-111—Tabbed by British Aircraft Corp. as the Viscount successor, this new British jet is "two Farn-

boroughs" away and won't fly until early 1963. Also using the Spey (two of them), the -111 sells for about \$2.3 million and will handle 57 mixed-class or 69 tourist passengers with promising economics in shorthaul operations. British United Airways has ordered 10 and optioned five and two U.S. locals, Frontier and Ozark, have letters of intent for six and five, respectively.

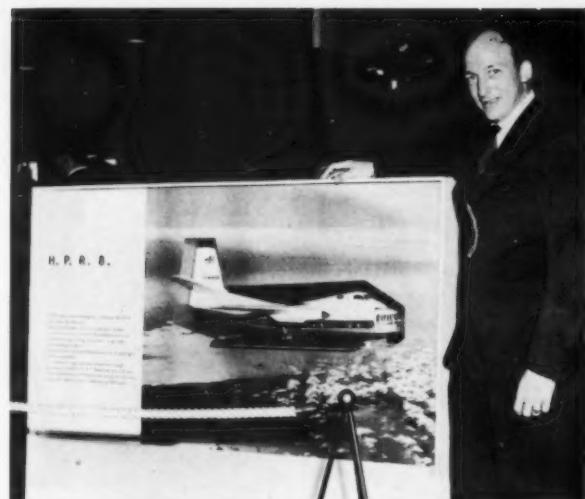
Avro 748—One of the few "live" exhibits on hand, this twin-Dart-powered short-range turboprop is being developed in three stages into the "E" version with RDAs engines to carry 60 passengers or a 14,000 lb. payload. The 748 Series I, due to be delivered soon to its first customer, Skyways Ltd., carries a 10,586 lb. payload. The Series 2 uses RDAs and carries 10,986 lbs. Some 21 748s have been sold and the new "E" version is being offered for



ROLLS-ROYCE VTOL interest was evident in exhibit of tactical transport using 16 lift-fan jets. Mirror gives double image.

next year delivery (*AIRLIFT*, Aug.).

Dart Herald—With its twin-Dart powered, high wing Herald in service with Jersey Airlines and on order by BEA, Maritime Central and Nordair, Handley Page is broadening its sights in two directions. One is the HPR.8, a development of the Herald, it hopes to sell to Silver City Airways as a car and bulk freighter. Grossing 53,800 lbs.



AUTO FERRY VERSION of Dart Herald, the HPR.8, is shown by Jim Phillips, technical sales manager of Handley Page.

as a car ferry (56,800 as a 100-passenger short-range passenger ferry), it would cruise at 199-201 knots with a fixed gear or 212.5 to 214 knots with retractable gear. An order by Silver City is likely.

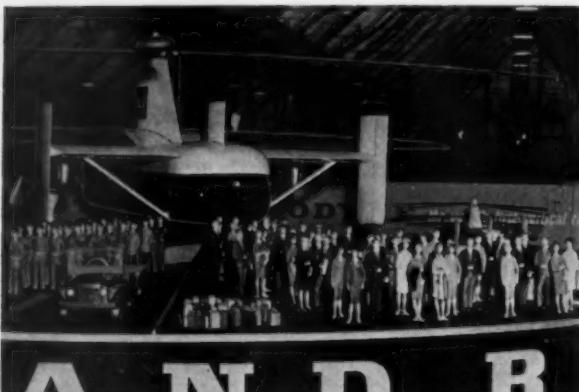
Handley Page's other project is a military close support version of the Dart Herald having a rear loading door, Dart RDAs, and a heavier (200 lbs./sq.ft.) floor. Compared to the Dart Herald (shown in parentheses) it would gross 46,000 lbs. (40,000); have a span of 94 ft. 9.4 in. (94.5); length of 80 ft. (75 ft. 5 in.) and height of 30 ft. 6 in. (24 ft.).

Vickers VC-10—Another promising attraction for Farnborough 1962, this British Aircraft Corp. big jet is due for fuselage-wing mating this month and probably will fly about June 1962. As Britain's next generation reply to the Boeing 707 and Douglas DC-8, it comes in two versions—a standard 310,000 lb. gross edition capable of carrying 150 economy passengers and the Super (322,000 lbs.) VC-10 with a 180-passenger capacity. BOAC has ordered both, 15 standards and 30 supers. Ghana Airways has ordered three and British United Airways four. First delivery: December 1963. A "Swing Nose" version of the VC-10 mentioned at Farnborough last year is now a dormant, if not dead, project.



LOGAIR ARGOSY operation of Riddle Airlines was "clocked" in clever display by Armstrong-Whitworth. At show's end,

Argosies on Logair had flown 180,819 route miles. A similar display for Havilland showed daily status of 47 Comets.



AND R

WESTLAND ROTODYNE, nee Fairey, shows military, passenger and cargo potential. Indecision clouds its future.



FOUR-JET VC-10, shown by Roger White-Smith who heads its sales, was ordered by RAF during the Farnborough display.

Argosy—Alone in its class as a small, yet high-producing, truck-bed-level freighter, the Armstrong-Whitworth Argosy is being pushed by the parent Hawker Siddeley Aviation for additional sales in the U.S. and Europe, possibly for early delivery by diversion of some of the 56 RAF aircraft now being built. The U.S. Logair operation by Riddle Airlines, featured in the HSA exhibit, will soon be bolstered by BEA's introduction of the Argosy in European freighter service. Lufthansa also is considered a strong prospect.

Short Belfast—Britain's big turboprop freighter, the Rolls-Royce Tyne-powered, swing-nose SC.5/31, is proposed to carry 141 passengers plus 60,000 lbs. of freight. The RAF military model, capable of 201 passengers or an 85,000 lb. cargo payload, is due to fly in late '62 and enter service in 1964. The Short Skyvan, a 15 passenger or 1.5 ton freighter, will fly early next year.

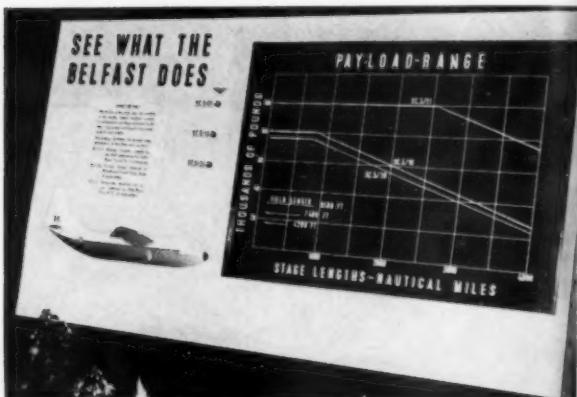
Farnborough sidelights—Hawker Siddeley's Avro 748 drew unexpected bouquets from Soviet designers Antonov and Ilyushin as the aircraft which impressed them most at the show. But direct questioning as to what Russia will use to compete with 707s and DC-8s over the Atlantic brought the usual reference to the big Tu-114 turboprop and vague hints that the four-jet Tu-110 is still alive.

It's not often that instrument producers can steal the show from plane builders, but this is the case with Smiths Aviation and its work in automatic flight control. Interest in the company's Para Visual Director (PVD) is catching on fast. Both FAA and Boeing will evaluate the "barber pole"-like ILS indicator in the U.S., Sud Aviation and Nord in France, KLM with the DC-8, plus others in Britain.

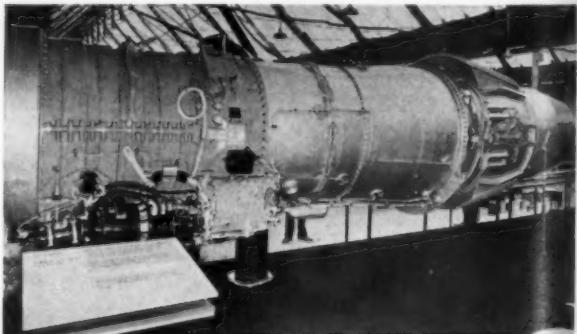
Alex Johnston, for six years chief of information activities for the Society of British Aircraft Constructors, leaves SBAC this month to join Bristol Siddeley in a key advertising and publicity post.

Hawker Siddeley Aviation is looking for a U.S. firm to market its Rolamat cargo loading system. On the Argosy, says HSA, Rolamat weighs less than 5.5% of capacity payload, costs less than 1% of aircraft price and can increase earning potential by about \$560,000 a year.

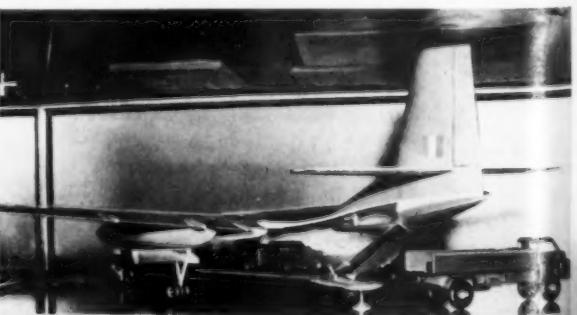
Post mortem: If Sud Aviation and General Electric hadn't worked so long and so hard at selling it, one might have considered the timing of the TWA Caravelle order a breach of ethics. It broke right in the middle of Farnborough week, the wrong time for the first Caravelles not to be fitted with Rolls-Royce Avons. ■



SHORT BELFAST is Britain's big freighter, due to fly in late 1962. Short's display stressed its payload/range performance.



BIG JET for the Vickers VC-10 is Rolls-Royce Conway R.Co.42/1 rated at 20,370 lbs. thrust on display at Farnborough.



MILITARY VERSION of Herald was exhibited by Handley Page. There is a good chance of an RAF order.

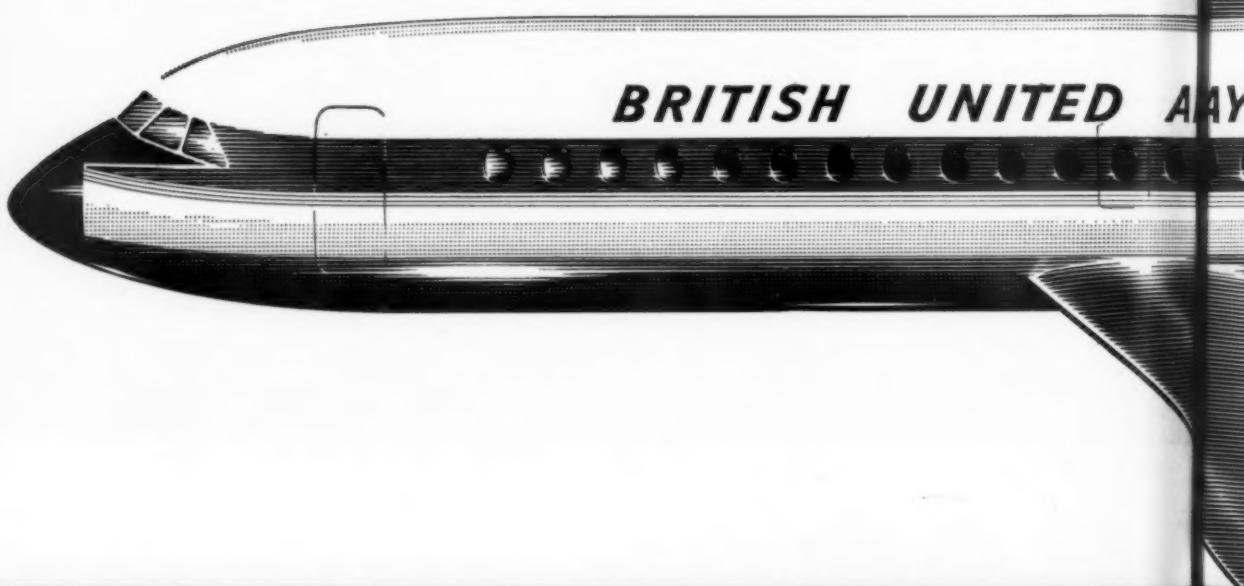
BRITISH
AIRCRAFT
CORPORATION

announces

BAC
ONE-ELEVEN
THE SHORT HAUL JET

JET SUCCESSOR TO THE VISCOUNT

BRITISH UNITED CHOSES THE SHORT HAUL JET



**JET SUCCESSOR TO THE VISCOUNT
WITH EVEN BETTER THAN VISCOUNT ECONOMICS**

AIRWAYS

AAYS

CS

IRLIFT



BAC **ONE-ELEVEN**

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BRITISH AIRCRAFT CORPORATION

BAC ONE-ELEVEN

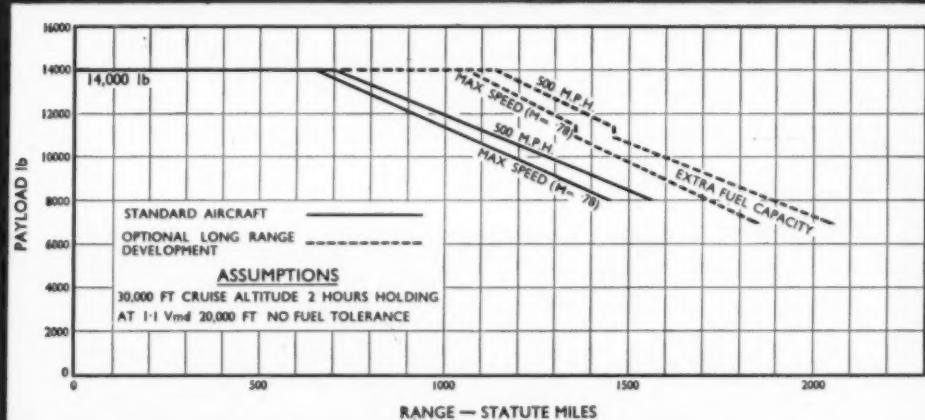
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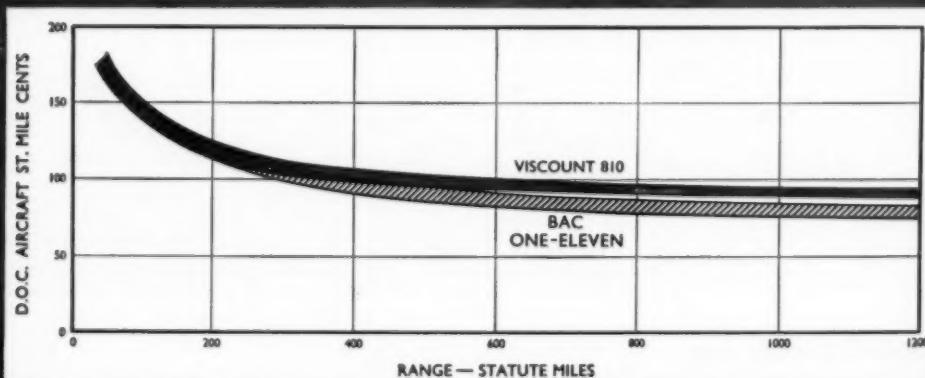
BRITISH UNITED AIRWAYS HAS CHOSEN THE OPTIONAL LONG RANGE DEVELOPMENT OF THE STANDARD AIRCRAFT

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PAYOUT v. RANGE



ECONOMICS



These bands cover seven separate methods of costing — ATA (1959), ATA (1960), SBAC and those of four airlines.

BRITISH AIRCRAFT CORPORATION
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What Project Horizon Hopes To Do

By ERIC BRAMLEY

THE \$7 BILLION INDUSTRY known as U.S. civil aviation is looking to Najeeb Halaby to produce the "aggressive" government support promised by Project Horizon.

The 328-page report on national aviation goals for the next decade carries President Kennedy's endorsement and a directive to Halaby, his aviation advisor, to translate the words into action.

Already in the works is a study of U.S. international aviation policy, recommended in the report. Actually, decision to make this study was made several weeks before release of Horizon. The research firm that will undertake the fact-finding report will be selected shortly. Halaby heads the steering committee.

Halaby also named 32-year-old Los Angeles attorney Frank E. Loy to serve as his assistant in implementing parts of Horizon, particularly international and aid to underdeveloped nations.

The report states that the U.S. trunks' financial condition must be improved. It wants less economic regulation, but aggressive government support for airlines' efforts to tap new markets.

It frowns on the U.S. trading away aviation rights for non-aviation reasons, and urges that certain inequities be dealt with even before completion of the international study.

Here are the task force's recommendations:

International: Unless the government gives aggressive support to U.S. international carriers, it may have to provide subsidy. Before the comprehensive study is completed, certain problems must be dealt with: correct inequities where foreign lines enjoy more favorable routes than U.S. carriers, where foreign lines compete at lower rates, and where foreign governments place unreasonable restrictions on U.S. companies. Consideration should be given to recreating the post of Assistant Secretary of State in charge of transport and communications.

Financial: Low profits of trunks plus Pan American and Panagra threaten the industry's financial structure. In next 10 years, these lines will be \$246 million short of cash requirements for equipment purchases and debt retirement (the problem is most acute with six smaller trunks). To increase earnings, carriers need better control over capacity, costs and load factors.

Economic regulation: As airlines grow, regulatory controls must be eliminated as much as possible, so that business incentives and competition can play a bigger role in regulation of rates and services. Further extension of service should depend on the need to bring self-supporting services within convenient reach of the most people.

Mergers should be encouraged which would strengthen marginal carriers, eliminate uneconomic competition and improve service. Subsidized service should be authorized only where its values will clearly exceed cost of subsidization. Operating restrictions no longer justified should be eliminated. Carriers must be allowed wide latitude in fares.

Marketing: Airlines must attract new business, and need the help of aggressive government policy. Ideas worth testing: air bus, special vacation travel packages, credit plane transcontinental excursions, fly-drive. In tariff filings, CAB should concern itself less with "legal niceties" and focus more on creative effects of the proposals.

Legal services: Carriers' financial position is not strong. More equity capital is needed. CAB's use-it-or-lose-it concept and the class mail rate system must be continued.

There is no overall solution for the locals' problems; there must be case-to-case determination.

Helicopter lines: Until promising new helicopters and V/STOLs are available, new certifications should be held to a minimum. A healthy debt-equity balance is a must.

Air Cargo: It is not clear that direct subsidy for cargo services is presently warranted. Indirect government aid should be provided through support of new cargo aircraft, expanded use of cargo services for mail and military cargo, and guaranteed loan legislation subject to close CAB scrutiny. In addition to Canadair CL-44 and C-141, optimum military cargo plane now under development, there is need for a new short/medium range turbine cargo craft.

Supersonics: A Mach 3 transport should be in service in the early 1970s. Prime contractor must be selected by mid-1964. Government funds should be used through research, design, development, prototype and probably production. The money can be recouped in royalties from airlines.

V/STOL: Except for applied research, acceleration of development of improved helicopters and other V/STOL craft is a matter for private enterprise.

Mail: Post Office should develop a fiscally-sound plan for airlift of all first-class mail and submit it to Congress, including price tags and impact on its own costs and revenues.

Airports: Federal aid must be continued and improved. Capital costs for facilities needed through the next 10 years are estimated at \$2.5 billion. Plans should be made now for a minimum of five more major airports (New York, Miami, Chicago, Detroit, Los Angeles) and 150 general aviation fields.

Air taxi: Consideration should be given to expanded use of taxi operators for movement of mail.

User charges: Consideration should be given to repeal of 10% transportation tax or to equitably relating the share of revenues derived from passengers to payment for use of the air traffic control system. Secretary of Commerce should study user charges as part of his overall transportation study.

Research and development: Within NASA, aeronautics is running a poor second to space technology. NASA should establish a senior technical group, headed by an aeronautical scientist, to provide leadership and direction in R&D. The agency must emphasize its in-house applied research, leaving the bulk of development work to industry.

Labor: Railway Labor Act has lost much of its effectiveness. It should be studied and a report made to the President in time to permit introduction of new legislation by next January.

Civil-military: A common air traffic system is required. FAA should establish a Federal Aviation Service which would man the system on a civilian basis in peacetime, but which would become part of the military in war or emergency.

Sales abroad: Diplomatic and technical missions abroad must help support sales efforts of U.S. manufacturers and airlines.

Underdeveloped nations: Results of U.S. aid for air transport are not completely satisfactory. Aid has been concentrated on international and not sufficiently on internal aviation needs. This policy should be reoriented. These nations' aviation activities must become locally owned and controlled as soon as possible. A single U.S. agency should handle aid.

**Research
Responsibility
Results**



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Caravelle Seat
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Model 588
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Pan American
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United Air Lines Boeing B-720



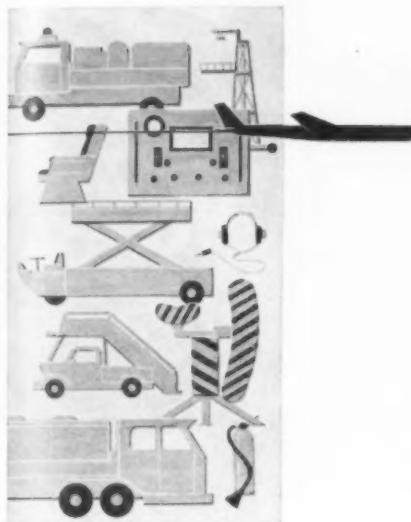
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airlift **BLUE BOOK**

CONTENTS

Accessories **32**



Read *AIRLIFT'S* survey of what airline engineers
think about air transport equipment



Ground Support **56**



Maintenance & Overhaul **65**



Airport Equipment **81**

Read Leigh Fisher's critical analysis of
airport terminal communications



Air Traffic Control **84**

TWA 1961

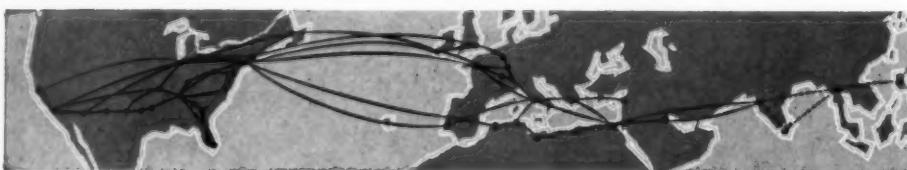


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TWA is now expanding its huge jet fleet with 30 of the newest and most advanced jets in the air. In every way, these are SuperJets plus: They have power plus: new high-thrust turbofan engines for shorter takeoffs, faster climb. Speed plus: to 625 miles an hour. Range plus:

increased fuel reserves. Comfort plus: they fly smoother, faster and higher, far above the weather. Dependability plus: added on-time capability. These 30 additional SuperJets will give TWA the world's finest fleet of 4-engine jets and bring you the world's finest jet service.

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What Airline Engineers Want in Equipment

By W. H. PITT

Manager of Line Service Engineering,
United Air Lines

The experience we have gained during operation of the large jet airplane has made it apparent that an examination of line maintenance concepts is in order. The objective in this case must be those areas in line maintenance that will most reduce flight interruptions due to mechanical malfunction.

The United Air Lines system of maintenance is similar to that of many other airlines in that a heavy maintenance check is scheduled on a 300-hour frequency and then a relatively light check is accomplished on a 50-hour frequency. In addition, non-routine maintenance is accomplished en route and at flight termination as required.



PITT

In the past, the general philosophy concerning this system was that accomplishment of a very complete heavy check would, in general, assure relatively trouble-free operation until the next heavy check. However, operation of the big jet has indicated a serious weakness in this assumption.

A careful look at the work package of a heavy check reveals that several things are accomplished. It is the logical time to replace all components or assemblies whose overhaul time is out of phase with the basic airframe overhauls. Engines, superchargers, variable speed drives, etc., are cases in point.

All of the routine "insurance" inspection is accomplished on the airplane and systems. This includes specific structural inspection as well as detailed inspection of all other components or

systems. Numerous repairs and replacements of all types occur, reflecting normal wear and tear during operation. Then there is the repair of all items reported in the flight log.

This is all the work that is necessary. Unfortunately, it does little to insure reliable mechanical operation of the airplane systems or components for a substantial period after the check.

This is the case because, with few exceptions, it is impossible to predict when a unit will malfunction, using test or inspection methods available today.

Causes are scattered

Malfunction of bearings, gears, switches, wires, connectors, seals, solenoids, valves, motors, control units, and other items of this type cause the bulk of our schedule interruptions. Very few of these exhibit a malfunction pattern leading to arbitrary repair or replacement related to the time since overhaul of the item, nor do they respond to action that could be taken at a heavy check.

This means that two courses of action are available to improve reliability. First, modify and improve performance of an item. In the over-all picture, this requires a considerable amount of time. The second is rapid analysis to pin-point the problem and rapid replacement of the part whenever this type of malfunction occurs.

The latter is the area where changes in the line maintenance philosophy can be extremely fruitful. It seems obvious that any immediate reduction in flight interruptions must come from ability to rapidly diagnose and repair malfunctions. The effectiveness of this program will be a direct reflection of our achievements in specialized training, proper manning, tooling, and parts support in smaller stations having scheduled layovers, as well as in augmenting the maintenance teams in larger stations for the same type of coverage.

Attachments Are Archaic

By J. A. DAUGHERTY

Aircraft Engineering
Power Plant Installation Section, TWA

The reluctance of the airframe and/or engine manufacturer to propose, and the air transport industry to accept, changes in the archaic methods of attaching accessories to the engine has, to some degree, detracted from the benefits gained in the transition to the jet powered aircraft.



DAUGHERTY

The stud and nut method of attaching accessories is probably as out of place on the jet engine as the hand crank on the present day automobile. However, it has proven to be a reliable method of accessory attachment. It is because of this demand for reliability, and the problems experienced with the newer type attaching methods, that the penalties of stud and nut attachment are accepted.

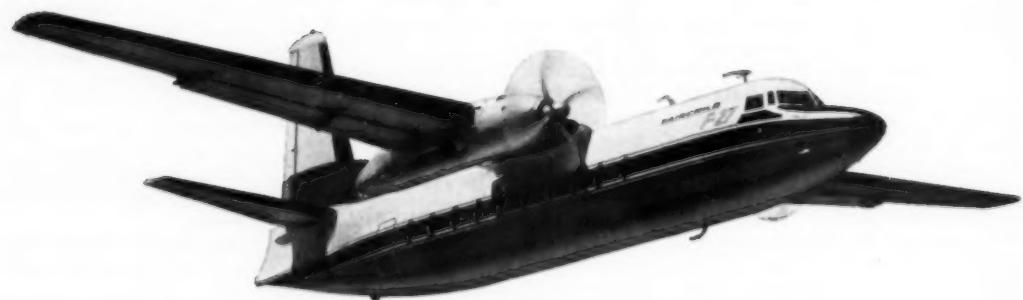
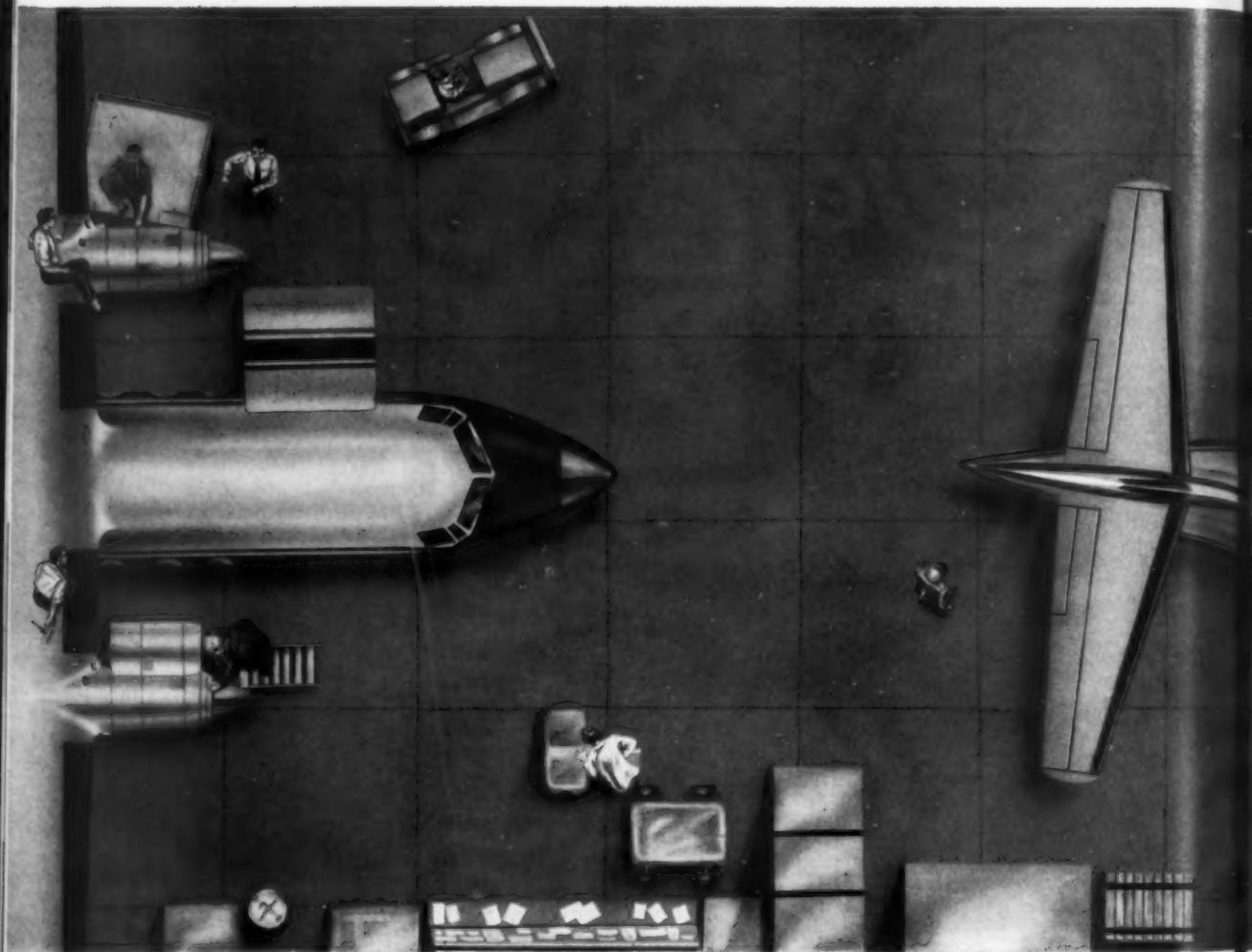
One of the major problems associated with the "V" band clamp and QAD is excessive drive spline wear. This has caused loss of the service of the accessory in flight and has caused premature engine gear box changes. The inability of the "V" band clamp or QAD to properly mate the accessory to its mounting pad, when torqued to specified values, has been the cause of this problem. Improvements in these alternate methods of attaching accessories, whether key hold slot, "V" band clamp or QAD, must be developed to assure reliability equal to the stud and nut method.

Some attaching methods, while acceptable on one unit, may not be on another. Therefore, the application of a specific attaching device is contingent upon the following considerations:

1. Loads imposed on the attaching device by vibration and overhang moment.
2. Shaft alignment requirements.
3. Temperature effects.
4. Accessory torque.
5. Ease of access on an assembled power jack.
6. Value of reduced time to change

Continued on page 86

There's a new airplane—the



NEW
transcontinental range
2800 miles, long range cruise



NEW
improved pressurization
higher cruise altitude



NEW
higher gross weight
increased to 39,400 lbs.



NEW
landing weight
increased to 37,500 lbs.



NEW
fuel capacity
1920 gallons



NEW
ground handling
improved nose steering



NEW
air conditioning
higher circulating flow



NEW
greater cargo capacity
increased payload

F-27 "F" Propjet

-coming
down the line
...NOW!

higher gross weight—transcontinental range

Fairchild's new "F" carries more, flies higher, goes farther—gets there faster. Unmatched in the medium transport field, the F-27 has been made even better by the progressive engineering improvements incorporated in the "F". It has no equal for utility and economy.

Versatile—As a utility transport it can carry 6 tons of cargo—44 passengers in airline seats or over 50 as a troop carrier—and it converts from one configuration to another in a matter of minutes. As a corporate aircraft it can carry an executive team non-stop coast to coast.

Modern—Newest in its category, the F-27 is designed spe-

cifically for turbine power. With its truck bed height floor, it's easy to load.

Economical—It's low first cost, low operating cost and high utilization factor have made it a proven money maker in airline service.

Rugged and safe—Over 50 million plane miles have been logged. Airline operators alone make an F-27 landing or take-off every two minutes—around the clock. The "high time" F-27 has already flown over 7500 hours. Six have flown over 6000 hours each and another six over 5000 hours.

If you'd like more information on this outstanding transport—write to F-27 Program Director, Hagerstown, Maryland.



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Vertical Speed Indicator
(Continental Development Corp.)



Acoustic Thrust Indicator
(Industrial Acoustics Co.)

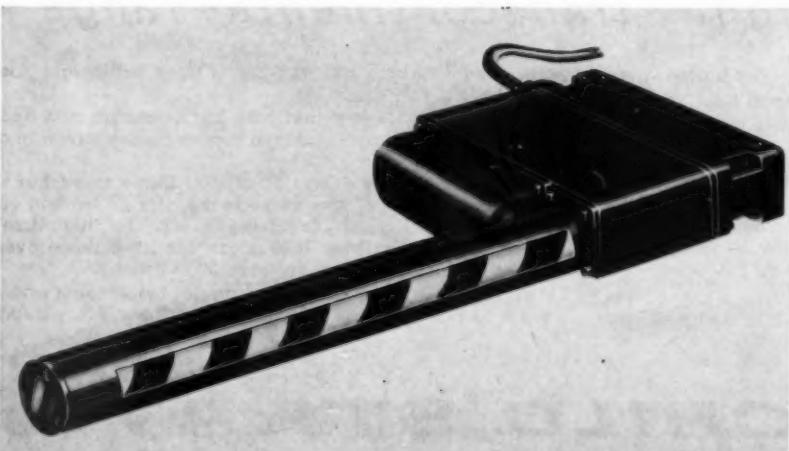


Airborne Weather Radar
(Radio Corp. of America)

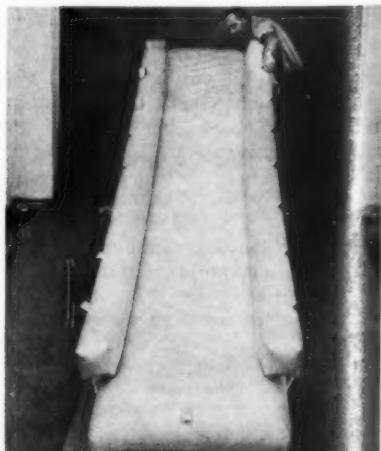
Accessories



INTEGRAL auxiliary power unit, shown in tail-on view of Convair 540, is a development of AiResearch for future transports.



PARA VISUAL DIRECTOR (*Smiths Aviation—England*) aids all-weather approaches.



CABIN evacuation slide (*Air Cruisers*).

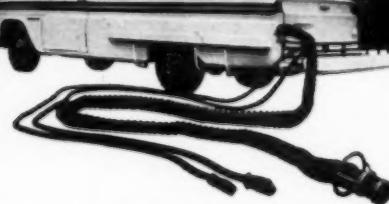
PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Actuator, electro-mechanical	Calco Mfg. Co., 205 Factory Rd., Addison, Ill.	C-7001B	4.00 x 2 13/16 x 5 9/16 Weight: 64 oz.	115 v. AC—400 cps 1φ, 90° at 100° lb. Open & close with declutching mechanism.	To operate on electrical or system failure for return of valve to pre-selected position.
"	"	C-7004	4 1/4 x 2.00". Weight: 23 oz.	115 v. AC—400 cps—1φ, 90° + 2° for operating dump & fill valves.	DC-8 & 707. Considered for 727 & 720.
ADF	Wilcox Electric Co., Inc. 1400 Chestnut St., Kansas City 27, Mo.	701C	1/2 ATR (S). Weight: 15 lbs.		
"	"	730C	1/2 ATR (S). Weight: 16 lbs.	Electric tuned.	
"	Collins Radio Co. 855 35th St. N.E., Cedar Rapids, Iowa	DF-202	1/2 ATR. Weight: 20.2 lbs.	90-1800 kc range.	Flush-mounted antenna.
Air conditioning, vapor cycle	Carrier Air Conditioning Co. Carrier Pkwy., Syracuse 1, N.Y.	75C2	Package. 60 1/2" x 14" x 20 1/2". Weight: 190 lbs.	Refrigeration capacity 45,- 600 btu/hr. Heating capacity 38,500 btu/hr.	Mohawk's Convair 240s.
Air data computer	Garrett Corp., AiResearch Mfg. Div., 9851 Sepulveda Blvd., Los Angeles 45, Calif.			Electromechanical system senses true angle of attack, static & total pressure, computes by analogs, alt. & mach functions for use as control signals, visual display and audible limit warnings.	Complies with ARINC characteristics for com- mercial transport aircraft.
"	Minneapolis-Honeywell, Aeronautical Div. Minneapolis, Minn.	HG8I	Per ARINC spec. 545	All-mechanical sensing & computing. 75 air data outputs. For automatic flight control & status indication.	Commercial jet aircraft.
Alternator, tach generator	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	Type 2CMII	Length: 5 5/64", weight: 2.7 lbs.	Standard tach, generator signal plus alternator for engine control subsystems.	Multi-engine jet trans- ports.
Altimeter	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	1593	Dimensions: 3" x 6 7/8"	Range:—1000 to 80,000 ft. Altitude pressure equivalent.	Provides 90% greater ac- curacy than previous model.
Amplifier, carbon microphone	Amplivox Ltd., Beresford Ave., Wembley, Middlesex, England	16360	1 1/2" x 3 1/4" x 11/16". Weight: 1/2 oz.		
Amplifier, passenger address	Bendix Radio Div., Avionic Products, Towson 4, Md.	AMA-10B	1/4-ATR (Short) 6.6 lbs.	40 watts output. Transistorized.	Airline & multi-engine business aircraft.
"	"	AMA-10A	1/4-ATR (Short) 6.1 lbs.	50 watts output (10 watts each from five output mod- ules.) Transistorized. TSO'd.	Airline & multi-engine business aircraft.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	734	1/4-ATR (S) 8.3 lbs.	60 watts output.	
Amplifier, speaker	"	749	6.6" x 6.6" x 2.7". Weight: 1.5 lbs.		
Anchor bushings (drill)	Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.	AB series	#55 thru 7/16" drill sizes	Used in sheetmetal or lam- inate plastic drill tem- plates.	Rivet, spotweld, press-in or embedded attachment methods.
Automatic flight control system	Lear, Inc., Commercial Air Transport Sales, 3171 S. Bundy Dr., Santa Monica, Calif.	L-102B	AFCS only. Weight: 86 lbs.	Automatic pitch trim, heading, hold, altitude control, heading select, auto VOR/LOC/GS coupling.	McDonnell 220, Learstar, F-27, Beechcraft, Aero Commander, Grumman Gulfstream, Sud Caravelle, JetStar, B-26.
Automatic radio beacon	Granger Associates, 974 Com- mercial St., Palo Alto, Calif.	NFD-130	3.9" x 3.9" x 29" (antenna folded). Weight: 9.5 lbs., complete	Freq: 243 mc. Output: w., 925 cy. Tone mod. Endurance: 24 hrs.	Over-water survival equip- ment. Automatic operation when packaged with liferaft.
"	"	ARB-117	3.9" x 3.9" x 29" (antenna folded). Weight: 9.5 lbs.	Freq: 121.5 mc. Output: w., 925 cy. Tone mod. Endurance: 50 hrs.	Over-water survival equip- ment. Automatic operation.
Autopilot	Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa	AP-103	100 lbs. installed.	FD-105 is compatible flight director system.	Gulfstreams, Vanguard, Convair.
"	Minneapolis-Honeywell, Aeronautical Div., Minneapolis, Minn.	H-14	All circuits contained in 1/2 ATR case. Total weight of basic system (incl. servos) is 25 lbs.	Functions include: 3-axis stabilization, full-time yaw damping, pitch and roll altitude command, auto- matic heading control, auto- matic ILS (opt.), auto- matic pitch trim (opt.).	Low-cost autopilot for light to medium multi-engine aircraft. Modified versions applicable to large, high- performance jet transports.
Baggage container	Hardman Tool & Engrg. Co., 1845 S. Bundy Dr., Los Angeles, Calif.		74" x 34" x 46.5". Weight: 85 lbs.	Twin fiberglass skin & foam core sandwich struc- ture. Integrally molded. In pulley brackets & struc- ture.	Boeing 707, 720, United Air Lines.
Blowers, electronic equip.	Plannair Ltd., Windfield House, Leatherhead, Surrey, England	4PL 141-H	6" x 10 1/4". Weight: 6 1/2 lbs.	28 v. DC.	1 kw-4 kw.
Brake system, anti-skid	Hydro-Aire Co., 3000 Winona Ave., Burbank, Calif.	00-161, 00-157-D, 00-125 and 00-205E			707, 880, DC-8 and 990 aircraft respectively.

120 KVA Electrical Power and Pneumatic Starting for Jet Aircraft...

AiResearch GPV-91
gas turbine and 120 KVA
alternator ground
power unit

This single AiResearch ground power package provides all the electrical and pneumatic power needed to meet the increased ground support requirements of the newest jet transports. At the same time, the new dual-purpose GPV-91 results in a unit that effects considerable dollar savings over separate units to provide pneumatic starting and electrical services.

The 120 KVA power package doubles previous electrical output of support systems to supply



all power for ground checkout and heating... and enables Freon refrigeration systems to operate at maximum capacity during the entire ground operation in hot weather.

The compact power unit consists of an AiResearch GTCP 85-91 gas tur-

bine driving a 120 KVA alternator. This gas turbine features automatic operation and pushbutton starting, operates in any weather extreme from -65° to 130°F . Optional 28 volt dc power is available up to 1600 amperes.

This lightweight power package can be installed on nearly any vehicle or carried as an onboard unit. AiResearch has delivered more than 9000 gas turbines in the 30 to 850 hp range, and is the world leader in producing turbine ground support for airliners.

Please direct inquiries to Los Angeles Division.

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Systems and Components for: AIRCRAFT, MISSILE, SPACECRAFT, ELECTRONIC, NUCLEAR AND INDUSTRIAL APPLICATIONS



New AMF 40,000 lb. Aircraft Cargo Loader

(Developed for U.S. Air Force Materials Handling Support System)

Incredible growth in aircraft numbers, capacity and speed created a problem for military air cargo handling: how to get planes loaded for take-off and, after landing, unloaded with speed and efficiency.

This 40,000 lb. Aircraft Loader, developed by AMF's Air Terminal System Group, under contract to Wright-Patterson Air Force Base, is part of the answer. The AMF Aircraft Loader is self-propelled, raises its cargo 13 feet, and has a remotely controlled winch that moves palletized

cargo into and out of aircraft.

The loader is one unit of a system in which cargo is carried on standard-sized pallets that move over conveyors and guide rails in aircraft. These align pallets, and permit rapid loading and unloading. Remotely controlled rail restraints secure pallets in flight.

In addition to this 40,000 lb. loader, AMF has under development 10,000 and 25,000 lb. capacity units, a universal lift vehicle, and auxiliary equipment for

maintenance and servicing aircraft.

AMF has also developed and demonstrated the universal cargo handling system used with the 40,000 lb. loader, and has designed this equipment to be compatible with all existing cargo aircraft planned for use by the Air Force.

The experience and knowledge gained from the development of this equipment is being applied by AMF's ATS Group to commercial airline problems.

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For detailed literature, write to: American Machine & Foundry Company, GOVPG, 261 Madison Avenue, New York 16, N.Y.



PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Cabin ventilation fan	Plannair Ltd., Windfield House, Leatherhead, Surrey, England.	6PL 122	8" x 9½". Weight: 18 lbs.	28 v. DC. 255 cfm at 1.3" WG.	
Cargo tie-down & seat fittings	Brown-Line Corp., 111 Main St., El Segundo, Calif.	Two stud models	Various—for different applications.	Fits standard or heavy seat track. For heavy duty loads.	EAL B-720 & 1049H.
Cases, ATR	Churchill Lighting Corp., 344 Franklin St., Melrose 76, Mass.	ARINC #404	12 different volumes.	Non-pressurized. Datalog #3.	All aircraft.
Coffee brewer	REF Dynamics Corp., 393 Jericho Tpke., Mineola, N.Y.	1439-I	22" deep, 6¼" wide, 25" high. Weight: 48 lbs.	400 cycle ac. Fully automatic coffee brewing cycle.	Skyvalley insert for American, Western & Continental Airlines.
Coffeemaker	Weber Aircraft Corporation, 2820 Ontario St., Burbank, Calif.	CM 104 to CM 108	19 to 31 lbs.	Brews 66 oz. fresh coffee in 3.5 min. Serves 12 to 15 cups.	
"	Nordskog Company, Inc., 16000 Strathern St., Van Nuys, Calif.	SI17 type	6½" W x 17½" H x 11½" D. Weight: 20 lbs.	208 v. 3 phase AC. Also available in DC. Recovery rate 45 sec.	Produces 48 oz. of coffee at each serving.
Compass system, MA-1	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	KD-3 gyro, KE-7 controller, KE-8 amplifier, KJ-4 transmitter	Weight: 16.8 lbs.	System accuracy: 1° gyro DG 4°/hr. Outputs for RMI and autopilot.	Can be applied on any fixed or rotary wing transport.
Compass comparator	Lear, Inc., Commercial Air Transport Sales, 3171 S. Bundy Dr., Santa Monica, Calif.	LCC-100	1/4 ATR. Weight: 4.5 lbs.	Compares signals of two compass systems or other systems.	All aircraft.
Commissary units	Cresci Aviation Equip. Co., Boulevard & Grape St., Vineland, N.J.	3 ton		PSI in system is never above 1200 to 1500 lbs.	Used by Swissair, Air France, Pan Am (Latin Div.), Lufthansa and Sky Chefs.
Compressor bleed control	Holley Carburetor Co., 11955 E. Nine Mile Rd., Warren, Mich.	R-92	12" x 5½" x 9½". Weight: 13 lbs.		Used on KC-135, 707, DC-8.
Computer, airborne navigation	General Precision—Liberator Division, 808 Western Ave., Glendale 1, Calif.	AN/ASN-24	0.55 cubic feet, 37 lbs.	2656 word memory, 160 kc clock rate. Meets military environmental requirements.	Applicable to any large aircraft.
Constant speed drive	General Electric Co., Aircraft Accessory Turbine Dept., 950 Western Ave., West Lynn 3, Mass.	AL-31 (LKH-40)	11" dia. x 11". Weight: 67 lbs.	64 hp. Input speed: 4300-7760 rpm, output speed 4000 ± 1%. Parallel, 120 KVA units.	Convair 880 & 990, CJ 805 & JT3 turbojet & turbopan units.
Crew seat	Aerotherm Div., Aerotec Industries, Inc., Bantam, Conn.	618	Width: 23.75, depth: 26.25, height: 38.00 full up—33.50 down; weight: 45.75.	Adjustable arm; 4.5 vertical adjustment; 4.92 fore & aft adjustment; shoulder harness assy.	Vickers-Armstrongs VC-10.
"	"	630	Width: 23.75, depth: 26.62, height: 37.19 full up—32.62 down; weight: 35.90.	4.94 vertical adjustment; 4.92 fore & aft adjustment; shoulder harness assy. Adjustable arm.	de Havilland DH-121.
Dehumidifier	Accessory Controls & Equipment Corp., 805 Bloomfield Ave., Windsor, Conn.	ACE-17	32" length, 22" width, 20" height. 360 lbs. weight.	Dehumidifies 30 SCFM to -60°F dewpoint at 5000 PSIG.	Used by all airlines to replace purchase of nitrogen. All jet aircraft operators.
Detector, flame	Pyroector, Inc., 349 Lincoln St., Hingham, Mass.	30-215	2" x 1 23/32". Weight: 3 oz.	Voltage: 20-30 v.D.C. Life: 10,000 hrs. Operating temp: -45° to 300°F. Shock mounts not required.	Vibration exceeds 15G to 2000 cps.
Detector, smoke	"	30-231	7" x 3¾". Weight: 10 oz.	Voltage: 20-30 v.D.C. Life: 10,000 hrs. Operating temp: -45° to 185°F. Shock mounts included.	
Distance measuring equipment (DME)	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	833	1/2 ATR (L). Weight: 30 lbs.		Transistorized.
"	Radio Corp. of America, Aviation Equip. Dept., 11819 W. Olympic Blvd., Los Angeles 64, Calif.	AVQ-70	Designed in accordance with ARINC 521B.	Solid state.	Evaluation units: first quarter, 1962; production: summer, 1962.
"	Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa	860E-1	1/2 ATR. Weight: 37 lbs.	Range: 0-97 nautical miles. Improved lock-on system.	
Doppler navigation system	Marconi's Wireless Telegraph Co. Ltd., Marconi House, Chelmsford, England.	AD2300A	Transmitter/receiver: long ¾ ATR; weight: 34.5 lbs. Tracking unit: long ½ ATR, weight: 23.8 lbs. Aerial—10" x 11¾" x 26¾", weight: 30.5 lbs. Indicator drive unit: long ¾ ATR, weight: 13.5 lbs.	Emission FM/CW; altitude: 20 to 50,000 ft.; grd. speed: 80 to 100 kts. Drift angle: 30° port to 30° starboard. Displays grd. speed and drift angle, distance flown up to 999.9 n.m. Accuracies: grd. speed ± 1.5%; 3 knots; drift ± 0.25%; distance flown ± 0.5%.	Specified by BOAC for Comet 4, M.E.A. for Comet 4C, R.A.F. for AW 660 & Comet 4C.
"	Bendix Radio Div., Avionic Products, Towson 4, Md.	DRA-12A/CPA-24A	Receiver/transmitter: ¾ ATR (Short), 15.4 lbs. Tracker unit: ½ ATR, 23.0 lbs. Antenna: 22½" x 25½" x 3½", 30 lbs. Control: 5¾" x 1¾" x 3½", 0.8 lb.	8800 mc transistorized. Fixed passive antenna. Dual NAC readout. 100-999 knots. Pitch limit: up to 45°. Roll limit: up to 60°.	Now in use by: United TWA, Swissair, SAS, JAL, El Al Israel, CAT.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Doppler navigation system	Collins Radio Co., 855 35th St., N. E., Cedar Rapids, Iowa	DN-101	Weight: 57.9 lbs.	3 beam with fixed lens antenna. Operates: 0-50,000'.	Purchased by Trans-Canada Airlines.
Electric quantity indicator	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	Types AW-61, AW-62, AW-40 Types AW-43, AW-59	Diameter: 2", Length (range): 1½" to 5", Weight (range): .5 to .9 lbs. Diameter 2½", weight .4 to .8 lbs.	Standard ratings for AC- DC volts, AC-DC amps, watts, frequency. Red or white inter-lighting optional.	Current transport applica- tions: KC-135, 707, DC-8, 880, C-130, C-133, Electra.
Electrical cable	The Lewis Engng. Co., 339 Church St., Naugatuck, Conn.	HTTS	No. 22 AWG thru No. 4/0 AWG		High temperature and fire resistant.
Electrical terminal block	Joy Mfg. Co., Electrical Div., 1201 Macklind Ave., St. Louis Mo.	6-32, 10-32	Varies according to requirements		Module terminal block. Airborne.
Electronic apparatus blower	Plannair Ltd., Windfield House, Leatherhead, Surrey, England	4PL 121	6" x 9½". Weight: 6 lbs.	28 v. DC, 130 cfm at 2.25" W.G.	
Engine performance indicator	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	Type SE-2	Each instrument (2 indicators): 4.8" x 17" x 6.5". Weight: 2.5 lbs.	Completely self-contained dual, vertical scale instruments presenting EGT, RPM, fuel flow, EPR & thrust.	Intended application on multi-engine jet transports.
Engine pressure ratio indicator	Garrett Corp., AiResearch Mfg. Div., 7851 Sepulveda Blvd., Los Angeles 45, Cal.		Indicator: 2" dia. x 3". Weight: .4 lbs. Transducer: 9.5" x 5" x 6.80".	Alt. range: 0-60,000 ft. Temperature: -45°F to 250°F. Meets commercial & military specs.	For turbine powered trans- port aircraft.
Evacuation slide, inflatable	Air Cruisers Div. (Garrett Corp.), Belmar, N. J.		Size varying for different aircraft.	Slide unfolds and inflates in one continuous operation.	Used on commercial pas- senger aircraft.
Exerciser cord, elastic	The Russell Mfg. Co., 400 E. Main St., Middletown, Conn.	X-1736	Per C. Ft.: 1/4"—70 lbs., 3/16"—1.21 lbs., 1/4"— 2.09 lbs., 5/16"—3.15 lbs., 3/8"—4.75 lbs.	* Indicate operating ca- pacity, pressures, or other pertinent ratings.	
Fan	Plannair Ltd., Windfield House, Leatherhead, Surrey, England	3 PLW	4" x 3 1/4". Weight: 22 oz.	50 cfm at 0.3" W.G. 12v. DC. 230v., 50 cps.	
"	Garrett Corp., AiResearch Mfg. Div., 7851 Sepulveda Blvd., Los Angeles 45, Calif.	MDF8-2, MDF48-2 and TDF52-I	2.04" dia. x 1.60". Weight: .36 lbs. 12.80 dia. x 12.48". Weight 28 lbs. 14.75" dia. x 7.10". Weight 18.5 lbs.	12,800 rpm, 24 cfm, .9" H ₂ O, 115 v., 400 cps. 7780 rpm, 5275 cfm, 18.13" H ₂ O, 200v., 400 cps. 11,200 rpm, 4450 cfm, turbine inlet 80° Hg abs.	
"	Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.	X-702-254D, -258, -259D, -314A and -343	12" x 12" x 16". Weight: 28.5 lbs. 10¾" x 10¾" x 11". Weight: 18½ lbs. 11" x 11" x 10". Weight: 34 lbs. 12¼" x 12½" x 14". Weight: 27 lbs. 16" x 16" x 15". Weight: 35 lbs.	2200 cfm at 24" W.G. Input: 400 v. AC, Hp: 11. 2000 cfm at 6" W.G. Input: 400 v. AC, Hp: 2.8. 1800 cfm at 32" W.G. Input: 400 v. AC, Hp: 12. 3450 cfm at 14" W.G. Input: 400 v. AC, Hp: 10. 3800 cfm at 1.84" W.G. Input: 27 v. AC, Hp: 2.25.	Cabin air conditioning blower, DC-8, Electra, 707, 720, 880, 990 and F-27.
Fastener, panel	Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.	P series	4-4 thru 1/4-28 thread sizes.	All presently used high strength materials.	
Fire extinguisher, automatic	Graviner Mfg. Co. Ltd., Poyle Mill Works, Coinbrook, Bucks, England		Lightweight minimum size.	28v. DC.	Suitable for aircraft power plants using non-toxic agents.
Fire extinguisher, dry chemical	Ansil Chemical Co., 1 Stanton St., Marinette, Wis.	5, 10-C, 20-D, 30-D	5, 10, 20 & 30 lb. dry chemical capacity.	Powered by CO ₂ cartridge. UL listed. Approved for class B and C fires.	Hand portable.
Flight control system, automatic	Sperry Phoenix Co., Div. of Sperry Rand Corp., Phoenix 27, Ariz.	SP-20, SP-30, SP-40, and SP-50			Airline & executive aircraft.
Flight reference system	Lear, Inc., Commercial Air Transport Sales, 3171 S. Bundy Dr., Santa Monica, Calif.	LIS-50	4" presentation. Electric— 16.8 lbs.	Presents attitude heading, course indication.	All aircraft.
"	"	4003	3" presentation. Electric— 3.7 lbs.	Presents attitude.	All aircraft.
Flow meter	Pioneer-Central Div., Bendix Corp., Davenport, Iowa	9133	Dimensions: 2 x 3 x 5 inches.	Flow range: 50 to 350 pph.	Meets S.A.E. as 407B.
Fuel control, turbo-jet	Holley Carburetor Co., 11955 E. Nine Mile Rd., Warren, Mich.	R-167	11.25" dia. x 10.75". Weight: 16.7 lbs.		N. American Sabreliner, McDonnell Trainer, Cana- dair transport, Lockheed JetStar.
Fuel pump, main	Chandler Evans Corp., Charter Oak Blvd., West Hartford, Conn.	9412, 9438, 9443, 9444, 9451, 9452, 9455, 9460,		Pratt & Whitney JT4-A10, JT12, JT3-C, JT3-D engines.	Used on DC-8, 707, 720, JetStar.
Fuel trimmer system	Lear, Inc., Commercial Air Transport Sales, 3171 S. Bundy Dr., Santa Monica, Calif.	LTR-100		Portable.	Remote trimmer for gas turbine engines.
Gauge	Nordskog Co., Inc., 16000 Strathern St., Van Nuys, Calif.	Customized to requirements of aircraft		Subject to individual cus- tomer requirements.	
Gate valves	General Controls Co., 1320 S. Flower St., Burbank, Calif.	AV16A, AV16B	3" x 5" approx. Weight: 1.5 lbs. 5" x 5" approx. Weight: 2 lbs.	Manual torque 20-inch-lbs. & under approx. 130 psig. ¾" through 6" tube size. Fuel, air, oil, water, 26 v. DC, 130 psig. motor- operated.	707, DC-8, 880, 990, 727, CL44.

FOR RUNWAYS WITH
A SOLID FUTURE

Concrete



Airline pilots will tell you,
"The new all-weather lighting systems work be-



Lighting installations are easy on concrete, even for existing runways. Cores for pancake lights are cut with standard portable rigs. Raceways for wiring are easily sawed and sealed. Idlewild Airport already has been modernized with complete centerline, narrow gauge and high-speed turnoff lights. Installation is under way on jet runways at Dulles International Airport.

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OU, ork best on runways of modern concrete!"

Centerline and narrow gauge patterns on light-reflecting concrete runways provide high landing visibility—even in "zero-zero" weather.

Pilots have always preferred concrete for its high visibility. Under all conditions, concrete reflects far more light than any dark surface can.

Concrete also has other advantages besides the added visibility from the new flush lighting systems. Only concrete permits permanent, trouble-free mounting of light fixtures. Concrete doesn't consolidate

under traffic, doesn't need frequent resurfacing that requires repositioning of lights.

Then, too, better braking becomes especially important in all-weather flying. In heaviest rain, tires can take a good, firm grip on skid-resisting concrete. For smoother take-offs, a solid, level concrete pavement means no disturbed air-flow over the wings. No dragging action on wheels, either.

You get economy, too. Concrete's tremendous strength and durability save real money through the years. It's the preferred pavement for *all* runways.

PORLAND CEMENT ASSOCIATION A national organization to improve and extend the uses of concrete

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Gearmotor, dual shaft	Western Gear Corp., Electro Products Div., 132 West Colorado St., Pasadena 1, Calif.	35YH38RP133	2.5" dia. x 7.0" length overall (inc. shaft extensions.) Weight: 3.75 lbs.	Output: high speed shaft: 1700 rpm at 144 oz. ins.; low speed shaft: 40 rpm at 1280 oz. ins. Input: 400 cy., 3ph., 200v.	DC-8, lavatory flusher motor.
Generator, brushless	Westinghouse Electric Corp., Aerospace Electrical Dept., P.O. Box 989, West Lima, Ohio	Y6QM28 (20KVA)	7.6" diameter x 11.25" long. Weight: 42 lbs.	3φ 120/208 volts, 380-420 cps. 7600-8400 rpm. 0.85 pf.	Can be obtained with a variety of standard mounting pads. 10" DBC mtg. flange. Air cooled. Integral exciter. MAGAMP or transistor regulator. "
	"	YQ130P (30KVA)	9.25" diameter x 11.16" long. Weight: 76 lbs.	3φ 120/208 volts, 380-420 cps. 5700-6300 rpm. 0.75 pf.	
Generator cooling unit	Plannair Ltd., Windfield House, Leatherhead, Surrey, England	3PL24I	5" x 7". Weight: 4 lbs.	400 cps 160 dfm at 4.5" w.g.	
Generator, DC, 100 amp.	Westinghouse Electric Corp., Aerospace Electrical Dept., P.O. Box 989, West Lima, Ohio	DB-10	6" diameter, 9" long. Weight: 22 lbs.	3000-8000 rpm. Cooled to 6000 ft.	Can be obtained with a variety of mounting pads. Uses AVR-97 transistor voltage regulator.
Generator, tachometer	Bill Jack Scientific Instrument Co., 143 S. Cedros Ave., Solana Beach, Calif.	AG34	MTG pod. AN20000. Weight: 8 oz.	Driven by turbo jet engine through accessory drive pod.	
	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	Type 2CM49	Weight: two pole-1.7 lbs.; four pole-2.1 lbs. (reciprocating engines).	Models available for various ambient temperatures.	
Harness inertia reel	Aeroterm Div., Aerotec Industries, Inc., Bantam, Conn.	95	Double reel assy. Width: 7.88; height: 2.38-mounting; depth: 2.06; weight: 22 oz.	Automatic rewind. Locks automatically at loads of 0.9 to 14Gs.	880, 990, DC-8, 707, C-130, 540, C-133, 720, 721, Electra, JetStar, CL44, Jet Commander.
Headset, jetlite	Amplivox Ltd., Beresford Ave., Wembley, Middlesex, England	15050	Less than 7 oz.		DC-8, T-39, 880, Republic Alouette.
Heater, aircraft	Janitrol Aircraft Div., Midland-Ross Corp., 4200 Surface Road, Columbus 4, Ohio	S-25	6" dia. x 16.5". Weight: 13 lbs.	25,000 btu/hr. output.	24 v. DC, operates on gasoline
	"	S-50	7" x 21.3". Weight: 16 lbs.	50,000 btu/hr. output.	"
	"	S-100	8.75" x 27.4". Weight: 22.5 lbs.	100,000 btu/hr. output.	"
	"	S-200	10" x 23.4". Weight: 27 lbs.	200,000 btu/hr. output.	"
Heater, aircraft space & anti-icing	Lucas Gas Turbine Equip. Ltd., Wood Top Works, Burnley, England	1/2 therm 2/2 therm 4 therm	37" x 7". Weight: 51 lbs. 51" x 12". Weight: 74 lbs. 63" x 20". Weight: 120 lbs.	50,000 btu/hr. 250,000 btu/hr. 400,000 btu/hr.	Self contained combustion heaters burning aircraft fuel and producing heated air for crew and passenger or freight compartments, or for de-icing.
Heater, auxiliary, cabin space	Western Gear Corp., Electro Products Div., 132 West Colorado St., Pasadena 1, Calif.	59-381	19 1/2" x 4 1/2" x 14 1/2".	Output: 7 1/2 kw of heat. Input: 400 cy., 3φ, 200v.	880 & 990.
Hose	B. F. Goodrich, Aerospace & Defense Products, 500 S. Main St., Akron, Ohio	All types as required			All types of aircraft.
Hydraulic accumulator	Parker-Hanifin Corp., Accessories Div., 17325 Euclid Ave., Cleveland 12, Ohio	1356-542897 thru 1356-583327 and specials	12 1/2" long x 2-13/16" OD. Weight: 3.8 lbs. empty. 33 3/8" long x 5-3/16" OD. Weight: 24.5 lbs. empty.	3000 psi. -65°F to + 275°F.	Used on Convair 880, Grumman Gulfstream, Lockheed Electra.
Hydraulic check valves	Kohler Co., High St., Kohler, Wis.	K-1206, -6, -8, -10, -12, -16 K-1280-4, -6, -8, (AN6280) K-1249-4, -6, -8, -10, (AN6249)		1500 psi.	Various aircraft.
	"			3000 psi.	"
	"			3000 psi.	"
Hydraulic selector	Whittaker Controls, Div.-Telecomputing Corp., 915 N. Citrus Ave., Los Angeles 38, Calif.	141385	To 3/4" T.S. To 2 1/2 lbs.	MIL-H-56-6 or Skydrol to 3000 psi. Flows to 20 gpm. Manually operated.	Variety of configurations.
Ice control, electric surface heater mat	Flight Support Div.-Pacific Airmotive Corp., 11248 Playa Ct., Culver City, Calif.		0.3 to 0.85 lbs. per sq. ft. Thinness varies from 0.03 to 0.07". covers surface to be heated.	Power loads from 0.1 to 50.0 watt per sq. in. From 28 to 208 v. AC or DC.	Lockheed Electra, Bristol Britannia, North American T-39, Argosy AW-650, Convair 990.
Igniter	Champion Spark Plug Co., 900 Upton Ave., Toledo 1, Ohio Lodge Plugs Ltd.	AA305-I			R. R. Conway engines. R. R. Avon engines. R. R. Dart.
	"	LR111			All jet-powered air & ground equipment.
	"	LR103/C			Lockheed JetStar.
	"	LR104/I			
	"	Various	Standard.		
	"	FHE-151			
	"	F5-47 AA345-I FHE-53-5 FHE-118-I FS-89-I			
	"	FHE-100-6 AA155, AA165, AA375, AA425 LR109			Airesearch gas turbine engines (support equip.).
Ignition assembly	Janitrol Aircraft Div., 4406 East-West Hwy., Washington, D. C.	IIC30	Weight: 4.5 lbs.	24 v. DC input, high frequency output.	Lockheed Electra, Convair aircraft, Boeing 707, 720, Douglas DC-8, R. R. Tyne

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Indicator, instantaneous vertical speed	Continental Development Corp., Box 511, Ridgefield, Conn.		Std. 3½" dia. Length: 5" overall. Weight: 1.42 lbs.	Standard static source. Externally or internally lighted, matte white or phosphorescent dial markings, 3000 ft/min. or 6000 ft/min.	Used by 15 U.S. and international airlines.
Indicator, position	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.		Length (range): 2-3½". Diameters: 2, 3, 1½". Weight (range): up to 0.5 lbs.	28 volt DC servosyn type, most models with red or white integral lighting & hermetic seal.	Current transport applications: DC-8, 880.
Indicator, radio magnetic	Lear, Inc., 3171 S. Bundy Dr., Santa Monica, Calif. Bendix Radio Div., Avionic Products, Towson 4, Md.	RMI-100 MN-72G	1/4 ATR (1/2"). Weight: 5 lbs. Standard 3½" diameter, 6" long, 2.5 lbs.	Dual RMI amplifier. Provides dual pointer VOR or ADF indications. TSO'd.	All aircraft. For use with Bendix or other ARINC navigation units.
Indicator, tachometer	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.		Weight: single ptr.—.7 lbs., dual ptr.—1.8 lbs.	Wide variety of scale presentations.	880, 990, DC-8, 707, C-130, 540, C-133, 720, 727, Electra, JetStar, CL44, Jet Commander.
Indicator, temperature	"	Type DJ-100	2" diameter x 6" case length.	Subdial, expanded scale or digital versions. ± 5°C accuracy for 100,000 cycles of endurance, 100°C ambient rating.	880, 990, Caravelle VII, C-130.
Indicator, vertical velocity	Pioneer Central Div., The Bendix Corp.	I453	Dimensions: 3½" x 5½".	Range: 4000-0-4000 ft/min. Response time: 3-5 seconds.	Compensated for rapid change of temperature.
Indicator, VOR/ILS	Bendix Radio Div., Avionic Products, Towson 4, Md.	MN-97H INA-21B	Standard 3½ inch diameter, 7" long, 3.25 lbs. Standard 3½ inch diameter, 6½" long. Weight: 20 lbs.	Provides OBS, FPD & relative heading indications. TSO'd. Provides omni-bearing selection (OBS) & flight path deviation indication. TSO'd.	For use with Bendix NVA-21A-22A or other ARINC navigation systems. For use with Bendix NVA-22A & MNA-21A or other ARINC navigation systems.
Inserts	Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.	S series	B-32 thru 3½-24 thread sizes.	Two-piece insert provides load bearing threads to soft materials.	
Instrument systems, command	Lear, Inc., 3171 S. Bundy Dr., Santa Monica, Calif.	CIS-100 L.I.F.E.	2 x ¼ ATR. Weight: 23 lbs., 4" presentation.	Provides command signals, combines VOR/LOC/GS Heading & Altitude.	Used by seven airlines.
Laminates	The Sierracor Corp., 903 N. Victory Blvd., Burbank, Calif.			Cabin windows. Enclosures. Cabin partition panels.	
Landing gear trainer	Burtek, Inc., Tulsa, Okla.	Boeing 707-720	6' x 9'.	Animated, back-lighted, motor driven.	For air crews & technician training.
Life raft, inflatable	Air Cruisers Div., Garrett Corp., Belmar, N.J.		Capacity, 25 persons.	Inflated by CO ₂ -air aspirated system, using Venturi principle, inflated in 9 seconds.	Used on commercial passenger aircraft.
Life vest, inflatable	"		For individual usage.	Inflated automatically by water-activated CO ₂ cartridge.	"
Light system, safety	Minneapolis-Honeywell Aeronautical Div., Minneapolis, Minn.	YG766A	To specification.	FAA approved. Meets requirements of CAR 4b. Maximum range: 100 mi. Daylight range up to 14 miles.	All aircraft.
Liquid level sensor	Simmonds Precision Products, Inc., Tarrytown, N.Y.	Type 384	Read: .0125 lb. Control unit: 0.5 lb. 28v. DC or 115v. AC.	Sensing liquid levels for warning lights, valves, pumps, etc.	Primarily helicopters, but applicable to any aircraft.
Load unit, antenna	SunAir Electronics, Inc., 3101 S. W. 3rd Ave., Ft. Lauderdale, Fla.	LU series	3" x 5" x 12". Weight: 3/4 lbs.	Pretuned at factory. Tuning over entire high frequency spectrum.	Permits antenna installations to any aircraft configuration.
Meter, overload protection	Simmonds Precision Products, Inc., Tarrytown, N.Y.	300066	2" diameter x 3". Weight: 14 oz.	Operates over 0-5 amp. & 0-50 amp., 400 cycle AC.	Applicable to any aircraft.
Microphone, hand	Amplivox Ltd., Buresford Ave., Wembley, Middlesex, England	15700	7" x 1½". Weight: 6 oz.		
Microphone, headset	"	Ampliflite Series A	Less than 15 oz.		Lightweight, aircrew, boom type.
Motor, fluid delivery, hydraulic	Vickers Inc., Detroit 32, Mich.	MF 039B011A MF 027B007A	5.57 x 4.5 x 4.5. Weight: 6.9 lbs. 6.15 x 4.5 x 4.5. Weight: 6.9 lbs.	3000 psi, 8000 rpm, Skydro. 3000 psi, 8000 rpm, Skydro.	Convair 990, flap motor. Convair 990, horizontal stabilizer drive.
Motor, fixed stroke, hydraulic	"	MS-3911-305431-4C MS 9-3911-30ZEE	5.37 x 4.25 x 4.25. Weight: 8.5 lbs. 5 11/32" x 4½" x 4½". Weight: 6.29 lbs.	3000 psi, 3280 rpm, Skydro.	Douglas DC-8, horizontal stabilizer drive.
"	"	MF 014B012A	5.18 x 4.25 x 4.25. Weight: 5.0 lbs. 4 3/16" x 2½" x 2½". Weight: 2.2 lbs.	3000 psi, 3280 rpm, Skydro.	Boeing 707 & 720 flap motor.
"	"	MF-69-3906-30BCD-4 MS24-3906-20-S435-4	4 11/32" x 2½" x 2½". Weight: 2.1 lbs.	3000 psi, 4660 rpm, Skydro.	Convair 880, flap motor.
"	"	MR14G-07-30-S437	6.38 x 4.38 x 4.38. Weight: 5.0 lbs.	3000 psi, 4660 rpm, Skydro.	Lockheed Electra, flap motor.
"	"	MF012B008A	4.68 x 4.25 x 4.25. Weight: 3.3 lbs.	3000 psi, 4300 rpm, Skydro.	Convair 880 & 990, fuel jettison motors.
"	"	MF005B006A	4.08 x 2.5 x 2.5. Weight: 1.7 lbs.	3000 psi, 10,000 rpm, Skydro.	Lockheed Electra air, compressor drive.
				3000 psi, 12,500 rpm, Skydro.	Convair 880 & 990, slat motor.
					Convair 880 & 990, fuel boost & jettison.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Motor, hydraulic	Lucas Gas Turbine Equip. Ltd. Shaffmoor Lane, Birmingham 28, England	I.P. 60 H. M. 4 I.P. 125 I.P. 5000 I.P. 1000 I.P. 3000	Weight: 7 lbs. Weight: 10 lbs. Weight: 13½ lbs. Weight: 54 lbs. Weight: 94 lbs. Weight: 120 lbs.	Max. speed 6000 rpm, at 360 gph input flow. Max. input pressure 3000 psi. Max. output 12 hp. Max. speed 4000 rpm at 400 gph input flow. Max. input pressure 3000 psi. Max. output 14 hp. Max. speed 6000 rpm at 750 gph input flow. Max. input pressure 3000 psi. Max. output 20 hp. Max. speed 3000 rpm at 1500 gph input flow. Max. input pressure 3000 psi. Max. output 35 hp. Max. speed 3000 rpm at 3000 gph input flow. Max. input pressure 3000 psi. Max. output 70 hp. Max. speed 2000 rpm at 600 gph input flow. Max. input pressure 3000 psi. Max. output 100 hp.	Aircraft hydraulics. " " " " " " " " " " " " " " "
Navigation computer	Canadian Marconi Co. 2442 Trenton Ave., Montreal 16, Que.	CMP 601, ASN 35	Weight: 23.5 lbs.	Digital.	For airlines, commercial or military aircraft.
Navigation, unit, VHF	Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford, England	Type 6402 (AD260 system)	Short ¼ ATR. Weight: 9 lbs.	Instrumentation outputs from either ILS localiser or VOR beacon.	For VC10 & Trident aircraft.
Navigation unit, VOR/LOC	Bendix Radio Div., Avionic Products, Towson 4, Md.	MNA-21A " NVA-22A	¼-ATR (SL). Weight: 3.9 lbs. ¼-ATR (Short). Weight: 9.0 lbs.	Provides outputs for manual VOR instrumentation systems. TSO'd. Provides outputs for manual & automatic VOR & localizer instrumentation systems. TSO'd.	Used with RA-21A or RA-22A VHF COMM/NAV receivers. Used with RA-21A or RA-22A VHF COMM/NAV receivers.
Nose gear up-lock cylinder	Electrol Inc., 85 Grand St., Kingston, N.Y.	EA1605	7.00 x 1.9. Weight: 12 oz.	3000 psi.	
Null field p-static discharger	Granger Associates, 974 Commercial St., Palo Alto, Calif.	NFD-613 NFD-612 NFD-611 NFD-610	7" long. Mounting area: 0.57" x 2.5". Weight: 0.5 oz. 11.5" long. Mounting area: 0.57" x 2.5". Weight: 0.7 oz. 3.5" long. Mounting area: 1" x 2.19". Weight: 0.44 oz. 1.16 oz. 11.25" long. Mounting area: 1.25" x 3.19".	5-10 typical installation, propeller aircraft. 15-20 typical installation, propeller aircraft. 12 installed on B-707/727, DC-8, 12 installed on CV- 880. 22 installed on B-707/720, CV-880, DC-8.	Provides 50-60 db reduction of radio noise caused by p-static or engine charging. " " " "
Nuts, blind	Hi-Shear Corp., 2600 W. 247th St., Terrance, Calif.	BN series.	4-40 thru ¾-24 thread sizes.	Stainless steel.	
Nuts, press	"	P series.	4-40 thru ½-20 thread sizes.	Simple press-in type nut.	
Oven, whirlwind	REF Dynamics Corp., 393 Jericho Tpke., Mineola, N.Y.	W-1224-4 (28 volts DC). W-1224-6B (208 volts AC).	18⅔" deep, 17½" wide, 17" high. Weight: 54 lbs.	W-1224-4, 28 v. DC, 3250 watts. W-1224-6B, 208 v., 3 ph, 400 cycles, 3250 watts	C-133, MATS aircraft. Used for frozen TV dinner type, or bulk type meals.
Ovens, dual compartment	Nordskog Co., Inc., 16000 Strathern St., Van Nuys, Calif.		Subject to individual customer requirements.	AC or DC models available with or without blower motors.	High temperature operating range 550°.
Over temperature system, jet pipe	Graviner Mfg. Co. Ltd., Poole Mill Works, Cointbrook, Bucks., England			115v., 400 cps or 28v.DC.	Continuous type detector, temperature compensated. Facility for two level warming.
Oxygen cylinder valve	Robbins Aviation, Inc., 2350 E. 38th St., Los Angeles 58, Calif.	R0600 series.	Weight: 2.2 lbs.	For 1800 psi oxygen cylinders like ICC 3HT slow opening.	TWA, American, Delta.
Oxygen line valve	"	OV601 Series.	Weight: .72 lb.	Up to 3500 psi operating pressure. 4 to 1 safety factor, slow opening.	Convair 880, TWA.
Oxygen mask, crew	Aerospace Div., Puritan Equipment, Inc., 1703 McGee St., Kansas City 8, Mo.	Sweep-on 114020.		Pressure breathing, quick donning, hangs on cockpit wall for rapid donning.	
Oxygen regulator	Pioneer-Central Div.-The Bendix Corp., Davenport, Iowa.	29215	37½" x 2 5/16" x 3 55/64". Weight: 1 lb. max.	Inlet pressure 200 to 400 psi. Altitude 0 to 41,000 ft. Flow range 0 to 450 lpm.	Designed for use with Pioneer-Central oxygen mask type GU-57.
Parking brake valve	Electrol, Inc., 85 Grand St., Kingston, N.Y.	450	1½" x 1¼". Weight: 2½ oz.	1000 psi.	
Passenger glide line reel assembly	Brown-Line Corp., 111 Main St., El Segundo, Calif.	21202	15" dia. x 2". Weight: 18 lbs.	Equipped with 100' high visibility yellow tape on tensioning reel. All parts rust resistant.	Used by PAA.
Passenger safety belt	S.A.R.L. L'AIGLON, B. P. 236, Angers, France	341	1.28 m. Weight: 0.365 kgs.	1350 kgs. T.S. order No. C22c from FAA.	Boeing aircraft, Caravelles, exec. planes, A.S.O.
Passenger seat	Aerotherm Div., Aerotec Industries, Inc., Bantam, Conn.	638	Width: 60.12. Depth- upright: 26.44, max. recline: 34.38. Weight: 73.81.	Max. recline to 35°. Integral E/A. Latchless integral food table.	Under development. Prototype completed. Boeing 707/727, Caravelle, BAC 111.

To fly faster than time itself...



Here's how the
Douglas trisonic jet
would beat the clock
on westbound flights



*Includes take-off
and landing time.

Trisonic jets that would land you in Los Angeles 2 hours earlier than your take-off time in New York are feasible says a late Federal study. Douglas officials say they could be operational by the early 1970's.

A 2100 mph civilian jet transport that would fly 13 miles high, cross the continent in one hour and thirty minutes*, and use present jet runways is on the drawing boards at Douglas.

Such an airplane is needed — says a recent Federal Aviation Agency study made with White House approval — to maintain U.S. leadership in commercial aviation. This is important because the export value of aircraft and parts in 1960 was \$1.4 billion or 5.2% of total U.S. exports!

The study also notes that substantial government assistance would be needed to underwrite the \$500 to \$550 million estimated development costs. Douglas believes that the estimated market of

200 to 300 Mach 3 aircraft would more than repay these development costs.

They are backing this belief with continuing studies based on 15 years experience with missiles, supersonic and hypersonic aircraft...to bring the trisonic civilian jet transport to reality at the earliest possible date.

DOUGLAS

MISSILE AND SPACE SYSTEMS • MILITARY AIRCRAFT • DC-8
JETLINERS • RESEARCH AND DEVELOPMENT PROJECTS •
GROUND SUPPORT EQUIPMENT • AIRCOMB® • ASW DEVICES

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Passenger seat, double	Aerotherm Div., Aerotec Industries, Inc., Bantam, Conn.	608	Width: 51.00. Depth-upright: 28.87, max. recline: 40.00. Weight: 99.34.	Max. recline to 60°. Cocktail table. Integral E/A. Breakover back. Removable cushions.	Pan American 707.
"	"	635	Width: 48.38. Depth-upright: 23.44, max. recline: 32.00. Weight: 78.62.	Max. recline to 38°. Emergency oxygen comp. Integral E/A. Sheet metal, box beam chassis.	United Air Lines. Caravelle.
"	Hardman Tool & Engrg. Co., 1845 S. Bundy Dr., Los Angeles, Calif.	3086 series	57" wide. Weight: 90 lbs.	55° recline, hydraulic seat back lock. Integral stewardess step.	Boeing 707, 720, 727.
"	"	8000 series	54.12" wide. Weight: 72 lbs.	38° recline, hydraulic seat back lock. Hardshell back. Individual passenger energy absorption.	Boeing 707, 720, 727.
Passenger seat, helicopter	"		Weight: 25.5 lbs. dbl; 15.5 lbs. single.	Hardshell seat back. Snap in cushioning.	Vertol 107, airbus seat.
Passenger seat, Euphorian	Century Universal, Inc., 1333 N. Utica, Tulsa 10, Okla.				For airline and executive aircraft.
Passenger seat, triple	"	8000 Series	59.60" wide. Weight: 80 lbs.	Hydraulic seat back lock, stewardess assist step, hardshell back.	Boeing 707, 720, 727
"	"	5005 series	60" wide. Weight: 93 lbs.	Hydraulic seat back lock. Soft back.	"
"	Aerotherm Div., Aerotec Industries, Inc., Bantam, Conn.	588	Width: 59.50. Depth-upright: 27.50, max. recline: 35.57. Height: 41.50. Weight: 96.51.	Max. recline 38° (\pm 3°). Integral E/A. Breakover-backs. Folding legs. Removable center arms. Removable cushions.	Pan American 707
Position transmitters	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.		Diameter: $1\frac{1}{2}$ ". Length (range): $1\frac{1}{2}$ " to 2". Weight (range): $\frac{1}{4}$ to $\frac{1}{2}$ lb.	28 v., 2 or 3 coil, d-c servos.	880
Pressure ratio indicator	Minneapolis-Honeywell, Aeronautical Div., Minneapolis, Minn.	LG14	5 x 5 x 10 in. Weight: 5 lbs. max.	Used to indicate ratio of inlet to exhaust pressure. Detects pressure changes of 0.001" hg.	Intended for all jet aircraft.
Probe, potential equalizer	Flexible Metal Hose Mfg. Co., 777 West 16th St., Costa Mesa, Calif.	CMS	Length (holder): $5\frac{1}{2}$ "; (probe): $5\frac{1}{2}$ ". Weight (complete): $1\frac{1}{4}$ oz.	P static & lightning control—jet aircraft.	
"	"	CMS-J2	Length: $10\frac{1}{4}$ " (overall). Weight: 1 oz.	P static & lightning control, piston aircraft.	
"	"	CMS-A	Length: $9\frac{1}{4}$ " (overall). Weight: $1\frac{1}{4}$ oz.	P static & lightning control.	
Pump, electric driven, anti-icing	Adel Div., General Metals Corp., Burbank, Calif.	22407-I	$3\frac{1}{2}$ " x 3 $1\frac{1}{4}$ " x $7\frac{1}{2}$ ". Weight: 3.2 lbs.	5 gph @ 70 psi.	Caravelle.
Pump, fixed stroke, hydraulic	Vickers Inc., Admin. & Engr. Center, Detroit 32, Mich.	AS 19058	15.5/32 x 6 $9\frac{1}{16}$ x $5\frac{1}{2}$. Weight: 20.2 lbs.	3000 psi, 2150 rpm, Skydrol fluid.	Boeing 707 & 720. Brake charge motor-pump.
Pump, gas turbine fuel	Lucas Gas Turbine Equip. Ltd., Shafmoor Lane, Birmingham 28, England	G.T.D.	Weight: 58 lbs.	Pressure 0-2000 psi. Flow 0-2600 gph at 300 rpm.	Used on Rolls Royce Conway engines.
"	"	G.D.S.	Weight: 25 lbs.	Pressure 0-2000 psi. Flow 0-1300 gph at 3000 rpm.	Used on Rolls Royce Dart engines.
"	"	G.B.B.	Weight: $8\frac{1}{2}$ lbs.	Lightened version of G.B.	Used on Bristol Siddeley Proteus engine.
Pump, hand	Regent Jack Mfg. Co., Inc., 11905 Regentview Ave., Downey, Calif.	4979	Type: variable displacement.	Piston diameter: $\frac{1}{2}$, 1 in. 3,000 psi.	
Pump, hydraulic	New York Air Brake Co., Watertown Div., Starbuck Ave., Watertown, N.Y.	165 W01003-3 165 W01007-2		3 gpm-3,000 psi.	Boeing 707.
"	"	44WBG 300		9 gpm-3000 psi.	
"	"	44 WAY 300-I		9 gpm-1500 psi.	Lockheed JetStar.
"	"	44 WAN 200		6 gpm-3000 psi.	Grumman Gulfstream.
"	"	44 WAF 200		6 gpm-3000 psi.	S-61.
"	"	W01011		6 gpm-3000 psi.	
"	"	165 W01004-4		3 gpm-3000 psi.	S-62.
"	"	165 W01010-1		3 gpm-3000 psi.	DC-8.
"	Lucas Gas Turbine Equip. Ltd., Shafmoor Lane, Birmingham 28, England	L.P. 60	Weight: 7 lbs.	Pressure 0-3000 psi. Max. flow 300 gph at 5000 rpm. Max. output 10.5 hp.	Aircraft hydraulics.
"	"	F.S.B.	Weight: 5 lbs.	Pressure 0-3000 psi. Max. flow 504 gph at 4000 rpm. Max. output 15 hp.	"
"	"	P1/2 300	Weight: 6 lbs.	Pressure 0-3000 psi. Max. flow 1200 gph at 8000 rpm. Max. output 40 hp.	"
"	"	H.O.D.	Weight: 21 lbs.	Pressure 0-3000 psi. Max. flow 1827 gph at 3500 rpm. Max. output 42 hp.	"
"	"	I.P. 1000	Weight: 94 lbs.	Pressure 0-3000 psi. Max. flow 3000 gph at 3000 rpm. Max. output 70 hp.	"
"	"	I.P. 3000	Weight: 120 lbs.	Pressure 0-3000 psi. Max. flow 6000 gph at 2000 rpm. Max. output 100 hp.	"
Pump unit, portable	Regent Jack Mfg. Co., Inc., 11905 Regentview Ave., Downey, Calif.	5336	Type: 2-piston.	Piston diameter: $\frac{1}{2}$, 1 in. Max. operating pressure: 5000 psi.	
"	"	5256	Type: single-acting.	Piston diameter: $11\frac{1}{16}$ in. Max. operating pressure: 3000 psi.	
Pump, variable delivery, hydraulic	Vickers Inc., Admin. & Engr. Center, Detroit 32, Mich.	AS43645-LC AS 61693-R-2	10.73 x 9.2 x 8.0. 11 $\frac{1}{4}$ x 10 x 7. Weight: 25.5 lbs.	3000 psi, 3400 rpm, Skydrol. 3000 psi, 3650 rpm, Skydrol fluid.	Douglas DC-8 main system pump. Boeing 707 & 720 main system pump.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Quadrastat control	Adams Rite Mfg. Co., 540 W. Chevy Chase Drive, Glendale 4, Calif.	3400	Approx. 11/4" x 4" x 91/2"; weight, 8.75 oz.		Irreversible control, infinite positioning. For throttles, valves, drag brakes, etc.
Receiver, ADF	Bendix Radio Div., Avionic Products, Towson 4, Md.	DFA-70	Receiver: 1/2-ATR 28.0 lbs. (including P/S). Control: 51/4" x 41/2" x 3.0 lbs.	90-1750k c. Digital counter frequency indicator—broad and sharp selectivity. TSO'd.	Airline and multi-engine business aircraft.
"	Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford, England	Type 6407 (AD 360 system)	Receiver—short 1/2 ATR. Loop—21/2" x 101/2" x 31/2". Weight: 27.5 lbs. including loop and controller.	Frequency range—100 to 1799.5 kc in 0.5 kc crystal controlled steps.	For VC10 and Trident aircraft.
Receiver, airborne teleprinter	"	AD308	Short 1/4 ATR; weight: 9 lbs.	Freq. range—any one of four crystal controlled freqs. in band 90-150 kc.	In use by BOAC on Boeing 707 aircraft.
Receiver, glideslope	"	Type 6404 (AD260 system)	Short 1/4 ATR; weight: 7.3 lbs.	Freq. range—329.3 to 335 mc, 20 channels at 300 kc spacing.	For VC10 and Trident aircraft.
"	Wilcox Electric Co., Inc., 1400 Chestnut Street, Kansas City 27, Mo.	700	Short 1/4 ATR; weight: 7 lbs.		Transistorized.
"	Bendix Radio Div., Avionic Products, Towson 4, Md.	GSA-8A	Short 1/4 ATR; weight: 7.8 lbs.	20 channel—TSO'd.	Airline and multi-engine business aircraft.
"	Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa	SIB-3	Short 1/4 ATR; weight: 6.4 lbs.	10 or 20 channel versions.	Major airlines.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	800	Short 1/4 ATR, 1/2 hi; weight: 5 lbs.		No moving parts.
Receiver, HF	"	603	19" x 7" x 81/4"; weight: 18 lbs.	Single channel.	
Receiver, marker	Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa	SIZ-3	1/4 short +/low ATR; weight: 2.9 lbs.	No moving parts, all solid state.	Introduced in fall of 1961.
"	Bendix Radio Div., Avionic Products, Towson 4, Md.	MKA-23A	1/4 ATR (SL); weight 2.1 lbs.	3-line output, transistorized, TSO'd, 14v. or 27.5v. input.	Airline, military and general aviation.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	702	Short 1/4 ATR; weight: 6 lbs.		Transistorized.
"	Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford, England	Type 6403 (AD 260 system)	Dwarf short 1/4 ATR; weight: 3 lbs.	Audio output—100 mw into 500 ohms, 75 mw into 100 ohms.	For VC10 and Trident aircraft.
Receiver, SSB	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	605	19" x 16" x 83/4"; weight: 48 lbs.	Modular construction.	
Receiver, VHF	Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa	SIX-2	Short 3/4 ATR; weight: 10 lbs.	880 channels 108.0-151.95 mc.	Used extensively on major aircraft.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	606	19" x 7" x 121/2"; weight: 211/2 lbs.	Single channel.	
"	Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford, England	Type 6401 (AD160 & 260 systems)	Short 1/4 ATR; weight: 8.5 lbs.	Freq. range: 108-135.95 mc, 560 channels at 50 kc spacing. Audio output: 100 mw into 500 or 100 ohms.	For VC10 and Trident aircraft.
"	Bendix Radio Div., Avionic Products, Towson 4, Md.	RA-21A	Short 1/4 ATR; weight: 8.4 lbs.	108.0-135.95 mc, 560 channels. Transistorized. TSO'd.	Airline and multi-engine business aircraft.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	RA-22A	Short 1/4 ATR; weight: 8.4 lbs.	108.0-151.95 mc, 880 channels. Transistorized. TSO'd.	Airline and military.
Receiver, VHF nav. (auto.)	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	706	Short 3/4 ATR; weight: 27 lbs.		
Receiver, VHF nav. (man.)	"	706	Short 3/4 ATR; weight: 22 lbs.		
Refrigeration system, vapor cycle	Carrier Air Conditioning Co., Carrier Pkwy., Syracuse 1, N. Y.	7581	Components 42 cu. ft. (approx.), weight: 160 lbs.	Refrigeration capacity approx. 13 tons.	Dual systems on DC-8.
Rivnuts	B. F. Goodrich, Aerospace and Defense Products, 500 S. Main St., Akron, Ohio		All types, sizes, grip ranges.		All types of aircraft.
SCAT Speed Condition, Approach/Takeoff	Safe Flight Instrument Corp., 4 Water St., White Plains, N. Y.		Weight: 15 lbs.	115v. AC.	Designed for all turbine powered transport aircraft.
Seat belts	Russell Mfg. Co., 400 E. Main St., Middletown, Conn.	RM-21, RM-23, RM-25, RM-27, RM-29, RM-31	50"—91 lbs. to 50"—110 lbs.	All to TSO-C22d.	
Seat/cargo tie-down track	Brown-Line Corp., 111 Main St., El Segundo, Calif.	20276 standard, 20864 heavy	20276—375#/1. 20864—45#/1.	For conversions and new aircraft.	
Secondary power/air conditioning system	Garrett Corp., AiResearch Mfg. Div., 9851 Sepulveda Blvd., Los Angeles 45, Calif.			Auxiliary gas turbines furnish compressor bleed air to air cycle refrigeration units, provide electrical power and hydraulic power.	Large turbojet or turboprop transport.
Selector switches, rotary	The Lewis Engrg. Co., 339 Church St., Naugatuck, Conn.	275, 115, 105	4", 2" and 3" in diameter.	24 to 28 points; 2 to 4 points; 5 to 20 points.	For thermocouples or resistance bulbs.



Flight Propulsion

Direct-lift Jet System Studied for VTOL Use In Subsonic Aircraft

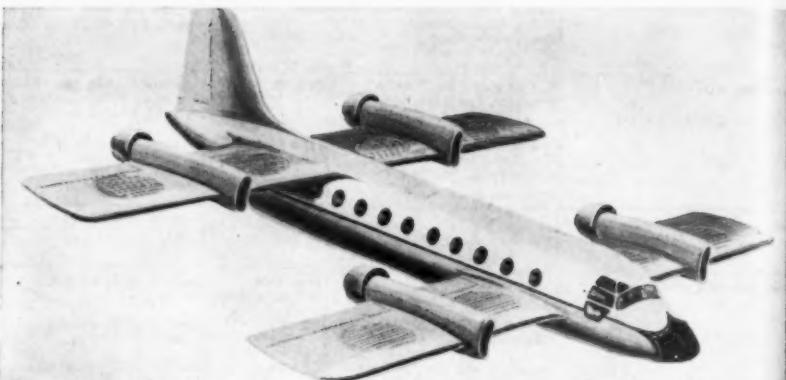
CINCINNATI, Ohio—A subsonic VTOL propulsion system that combines vertically mounted direct-lift turbojets with conventional jet powerplants is currently under study at General Electric's Large Jet Engine Department here.

In the direct-lift system, one of several VTOL propulsion techniques under investigation throughout G.E.'s Flight Propulsion Division, vertical thrust for take-off and landing is provided by small direct-lift jet engines tandem-mounted in the aircraft's fuselage. Additional vertical thrust is provided by the primary turbojets, which are equipped with diverter valves.

Once vertical take-off has been achieved and the aircraft has transitioned to horizontal flight, the direct-lift engines are cut off and the primary turbojets, with diverter valves repositioned, propel the aircraft throughout its operating radius.

An important advantage of the direct-lift VTOL system, according to General Electric propulsion engineers, is that it will eliminate the necessity of increasing the size of an aircraft's primary turbojets to obtain the increased thrust needed for take-off and landing. This, in turn, will allow optimum performance of the primary turbojets for the cruise phase of operation.

Direct-lift turbojets under study at G.E. can be scaled for various designs which require more than two direct-lift engines, or for aircraft designs capable of supersonic performance.



VTOL transports such as this, G-E engineers predict, can be a key solution to traffic problems in today's air terminals. In this design, vertical lift is provided by eight G-E lift fans mounted in the wings and powered by turbojet thrust diverted by valves from the primary engines. Aft-fan power will take over for horizontal cruise.

VTOL Transports to Cut Traffic Problem

CINCINNATI, Ohio—Traffic efficiency in today's overcrowded airports will undergo a major improvement when VTOL aircraft for intercity transportation become a reality, predict General Electric engineers.

For example, they said, VTOL designs like the artist's conception shown above may be capable of multiplying traffic volume of existing airports by a factor of ten. Such short-range transports could further supplement airport operations by using "V-ports" located close to downtown areas.

The airframe design shown here, one of several VTOL concepts now under study at General Electric's Flight Propulsion Laboratory Department, incorporates eight G-E lift fans, each driven by wing-mounted turbojets. Diverter valves would control the direction of engine exhaust flow. One of

each pair of engines operates only during take-off and landing, each driving a lift fan. The other engine powers a lift fan for vertical take-off and landing, and provides aft-fan turbojet thrust during cruise.

Aircraft of this type are considered feasible for travel between major cities located from 200 to 500 miles apart.

High Power-ratio Turbojet Available for VTOL Aircraft

LYNN, Mass.—A lift version of the J85 turbojet engine that has a 10.3 to one thrust-to-weight ratio—the highest of any engine currently available—is now being offered for VTOL applications by General Electric's Small Aircraft Engine Department.

Designated the SJ132, the engine can be ordered now, with delivery subject to a lead time of 12 months.

The SJ132 turbojet, which incorporates existing components of the J85-7 and -5 engines with almost no changes, produces a guaranteed thrust of 3050 pounds. It is especially applicable to VTOL applications in that it can be successfully started and operated in horizontal, vertical, and all intermediate positions, and can provide bleed air up to 10 percent of inlet mass flow for operation of jet reaction VTOL control systems and other purposes.

Considered as a 50-hour auxiliary powerplant, the SJ132 engine can be applied to VTOL techniques using a variety of principles—including direct lift, lift fan, boost engine, or jet pump.

General Electric J85 engines, which have already logged over 33,000 hours, are now accumulating time at an accelerated rate as powerplants for SAC's GAM-72 decoy missile and the ATC's T-38 supersonic trainer.

The G-E SJ133, a more advanced turbojet whose details are still classified, can be available in two years.



In this artist's concept of a subsonic VTOL system now being studied by General Electric, small direct-lift turbojets mounted in the fuselage and equipped with movable louvered doors, provide lift during take-off and landing operations. Their thrust is supplemented by diverting power from the primary turbojets, which then take over after transition to horizontal flight. Advantage of the system is that it provides optimum engine efficiency during cruise by eliminating need to increase primary turbojet size for additional lift thrust.



Turbocopters to Improve Los Angeles & New York Airways Service



General Electric-powered turbocopters having twice the capacity and 50 percent greater speed than their piston predecessors will close the jet-age transportation gap for a growing number of air travelers on the East and West Coasts.

New York Airways' new Boeing-Vertol 107's—powered by twin G-E CT58 gas turbine engines—are designed to carry 25 passengers at a

cruising speed of 155 miles an hour. At this speed, free of the traffic congestion below, it will take only six minutes from LaGuardia to Idlewild Airport and seven minutes from Manhattan's Wall Street heliport to Idlewild. Service to Newark and Westchester will be comparably quick.

Los Angeles Airways' G.E.-powered Sikorsky S-61's carry 28 passengers at cruising speeds of 135 miles an hour.



The new turbocopters will offer fast, quiet service linking Los Angeles International Airport with such suburbs as San Bernardino, Riverside, Pomona, Ontario, and Anaheim/Disneyland.

For both turbocopters, twin-installations of the 1250-hp, 300-pound General Electric CT58 engine produce 1000 more horsepower than a helicopter reciprocating engine, yet together total less than half its weight.

Convair 880-M Jetliner Enters International Service

SAN DIEGO, Calif.—Convair's new 880-M jetliner is now actively serving points in South America, Europe, Alaska, and the Far East after recently entering service with CAT, VIASA, Swissair, and Alaska Airlines.

During the Swissair delivery flight from New York to Zurich, a distance of 3855 miles, the 880-M completed the longest non-stop distance record ever made by a Convair jet transport.

Japan airlines will soon join CAT with 880-M passenger service in the Far East.

Powered by four General Electric CJ-805-3B engines, the Convair 880-M successfully completed a nine-month flight test program early in August. Increased thrust of the CJ-805's—11,650 pounds each—allows the 880-M a maximum takeoff weight of 192,700 pounds. Maximum cruise speed is 615 miles per hour.

The 880-M is identical in exterior appearance to the 880, except that eight leading edge slots and two leading Krueger flaps are employed to reduce landing and takeoff distances.

The Republic of China's Civil Air Transport (CAT) is using its new 880-M, christened the "Mandarin Jet," on runs from Taipei to Okinawa, Tokyo, Seoul, Manila, Hong Kong, and Bangkok.

Venezuela International Airline (VIASA) flies its new 880-M on routes from Caracas to New York, Miami, New Orleans, Bogota, and Lima.

VIASA's 880-M's will seat 93 passengers—12 in a forward lounge, 32 in a four-across first-class section, and 49 in a five-across coach area. The jet airliners are designed with three galleys,



Civil Air Transport's 880-M "Mandarin Jet" now links major points in the Far East.

one aft, and two forward, and are fully equipped for over-water flights.

Alaska Airlines also flies the 880-M on routes between Seattle, Washington; Fairbanks and Anchorage, Alaska. Their Golden Nugget Jet flies the 1565-mile trip from Seattle to Fairbanks in two

hours and 50 minutes, considerably faster than any previous schedule.

Japan Air Lines (JAL) will soon have a fleet of five 880-M jets in service on JAL's Southeast Asia routes, and Swissair has announced that two new aircraft will soon serve all Far East points of its international network.

SEND COUPON FOR FREE BROCHURES

For free bulletins on the G-E engines and propulsion projects discussed above, just check below and send coupon to General Electric, Section B206-35, Schenectady, New York.

- GED-4507 "VTOL Propulsion Systems"
- GED-3987A "The CT58 Engine"
- GED-4666 "The J85 Engine"

Other _____

NAME _____

TITLE _____

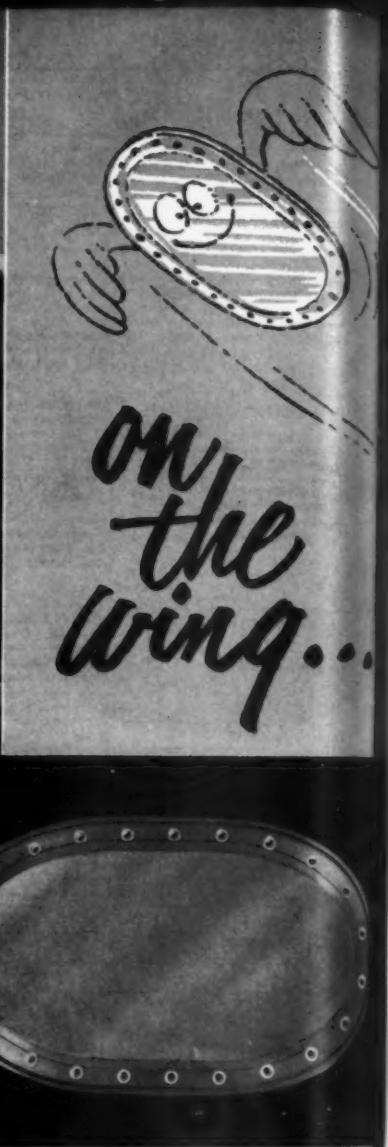
COMPANY _____

ADDRESS _____

GENERAL ELECTRIC

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Shock absorber cord, elastic	Russell Mfg. Co., 400 E. Main St., Middletown, Conn.	X-867, X-868, X-869, X-870, X-871, X-872, X-875	Per 100 ft. 3/16"-.75 lbs. 1/4"-2.40 lbs. 5/16"-2.70 lbs. 3/8"-4.47 lbs. 1/2"-7.64 lbs. 5/8"-12.20 lbs. 3/4"-18.25 lbs. 1"-33.41 lbs.		
Sky galley	REF Dynamics Corp., 393 Jericho Tpke., Mineola, N. Y.	1175-I	35" deep, 49" wide, 79" high; weight: 320 lbs.	400 cycle AC oven compartments. Tray carrier, cup drawer, ice cream drawer, milk & ice drawer inserts. Stainless steel & aluminum const.	American, Western & Continental, Electra, 707 & 720 aircraft. Also related equip. for Pan American DC-8 & Eastern 720B & Electra.
Skyphone	AC Spark Plug Div., Flint, Mich.		1/2 ATR box, UHF antenna, desk type telephone; weight: 28 lbs.	450-470 mc.	Connects thru telephone company base stn. to world wide telephone system.
Smoke detector/indicator	Graviner Mfg. Co., Ltd., Poole Mill Works, Cainbrook, Bucks, England			28v. DC and visual.	Light weight miniaturized smoke detector. Visual smoke indicator for instrument panel mounting.
Solenoid, pilot-operated	Whittaker Controls, Div., Telecomputing Corp., 915 N. Citrus Ave., Los Angeles 38, Calif.	143395	To 3/4" T.S. Weight: 3.5 lbs. max.	28v. DC, 3000 psi, MIL-H-5606 or Skydrol.	For hydraulic selector.
Solenoid selector valves	General Controls Co., 1320 S. Flower St., Burbank, Calif.	AV11, AV13, AV14	2 3/4" x 5 1/4" approx. Weight: 1 to 9 lbs.	28v. DC, 300 to 3000 psig	1/4" thru 1" tube size.
Solenoid shutoff valves	"	AV1, AV9, AV2	1/4" x 4 1/2" approx. Weight: 1/2 to 2.50 lbs.	28v. DC, 15 to 1500 psig.	
Spark plugs	AC Spark Plug Div., Flint, Mich.	171-173-175 271-273-275 281-283-288 RS19-2RS	16-24 conn. barrel-std. 3/4-20 conn. barrel-std. 3/4-20 conn. barrel-std. Wright Cyclone: 188A3, 188D1; P & W R1830; P & W R2000. Wright turbo compound engines. P&W 2800.	Massive electrode spark plug. Fine wire spark plug.	
"	Lodge Plugs, Ltd.	RS35-R			
"	"	R28-3R			
"	"	RH837E, RH832E, RH829E			
"	Champion Spark Plug Co., 900 Upton Ave., Toledo 1, Ohio				377; CV-240, CV-340, CV-440; DC-3, DC-4, DC-6, DC-7; 202, 404; L-049, L-749, L-1049, L-1649.
Speed sensing controls	AC Spark Plug Div., Flint, Mich.	8575636	3" d=4" h; weight: 4 lbs.	For Allison 501-D13.	
Stall warning	Safe Flight Instrument Corp., 4 Water St., White Plains, N. Y.		Weight: 6.6 lbs.	27.5v. DC, 115v. AC	For all aircraft.
Switch, mach-airspeed warning	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	31,000	3 1/2" x 3 1/4" x 4".	Altitude range: 0-50,000 ft. Indicated airspeed: 383 or 397 knots. Mach no. .890 or .880.	
Tape displays	Minneapolis-Honeywell Aero-nautical Div., Minneapolis, Minn.		To customer specifications.	Employs tape servos and synchros to display fuel status, pressure ratio, weight and balance, altitude, air speed, mach, rate of climb, temperature.	All aircraft.
Temperature detectors, resistance	The Lewis Engrg. Co., 339 Church St., Naugatuck, Conn.	5482 and eight other models	Base 2" x 2". Sensing surface, 1.43" diameter.		
Temperature indicators, exhaust	"	152B	2" diameter case to MS 33598.	0 to 1000°C thermocouple type.	Hermetically sealed.
"	"	152CBL	2" diameter case to MS 33598.	0 to 1000°C thermocouple type.	Hermetically sealed, integrally lighted, 5 v.
Temperature sensors, thermocouples	General Electric Co., Instrument Department, 40 Federal St., West Lynn, Mass.		Dependent on engine.	Temperature ranges to 5000°F.	Typical current transport applications: 800, 990, Caravelle, Jet Commander.
Thermocouple, jet engine	Lodge Plugs Ltd.	RC117 RC123, RA835, RA889, RA890		R. R. Conway. R. R. Avon.	
"	"				
Thermometer-indicator	The Lewis Engrg. Co., 339 Church St., Naugatuck, Conn.	162BCL	2" diameter case to MS 33598.	28 v. DC, calibrated to MIL-B-7990 curve. Electrical resistance type.	Hermetically sealed, integrally lighted, 5 v.
"	"	162B	2" diameter case to MA33598.	"	Hermetically sealed.
Tie-down strap assemblies	Brown-Line Corp., 111 Main St., El Segundo, Calif.	NAS 1211, NAS 1212, NAS 1213	Various.	For various tie-down applications per specification.	For ground support equipment & aircraft applications.
Transceiver, remote control	SunAir Electronics, Inc., 3101 S. W. 3rd St., Ft. Lauderdale, Fla.	T-22-RA	1/2 ATR, 19 1/2" x 4 7/8" x 7 1/2". Weight: 15 lbs.	Power output: 45W; frequency range: 2.0 to 18.0 Meg.	Has self-contained, transistorized, 28-volt power supply. Ferrite core, adjustable coils permit finer tuning and greater output. Certified to FAA TSO specifications.
Transformers, current	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.	Types JY-20, JY-21, JY-22, JY-23, JY-24, JY-25	Weight (range): .25 to 2.5 lbs.		Current transport applications: Electra, 880.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Transmitter, HF	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	96	24½" x 72" x 12-5/16" (XMTR).	HF.	2500 watts.
Transmitter, LF beacon	"	96-200C	24½" x 72" x 36½". Weight: 325 lbs.	2400 watts.	
"	"	444	24" x 47½" x 17".	50 watts.	
Transmitter, marker beacon	"	429B	14.6" x 47" x 15.5".	Single or dual pole mounted incl. antenna.	
Transmitter, mass fuel flow	General Electric Co., Instrument Dept., 40 Federal St., West Lynn, Mass.		4.1 lbs. to 18 lbs. depending on range.	Ful scale ranges from 500 pph to 600,000 pph.	880, 990, DC-8, 707, C-130, 540, C-133, 720, 727, Electra, JetStar, CL44, Jet Commander.
Transmitter, multi-frequency	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	99	33" x 30" x 72". Weight: 1500 lbs.	HF/LF/VHF, SSB.	250 to 400 watts, 1000 watts (PEP).
Transmitter, SSB	"	96	29½" x 72" x 27¾" (P. S.)	SSB.	5000 watts (PEP).
Transmitter, VHF	"	707	½ ATR (S.) Weight: 12.5 lbs.	30 watts output.	
Transmitter, VHF	Marconi's Wireless Telegraph Co. Ltd., Marconi House, Chelmsford, England	Type 6400 (ADI60 system)	½ ATR (S.) Weight: 14 lbs.	Frequency range: 118 to 135.95 mc, 360 channels at 50 kc spacing. Power output: 25w into 52 ohms.	Forms part of the sixty series equipment specified by BOAC for VC10 and BEA for Trident.
Transmitter, VHF	Collins Radio Co., 855 35th St. N. E., Cedar Rapids, Iowa	171-7	½ ATR (S.) Weight: 14 lbs.	600 channels 118.0—151.95 mc. 25 watts output.	Used extensively on major airline aircraft.
Transmitter, VHF	Bendix Radio Div., Avionic Products, Towson 4, Md.	TA-22A	½ ATR (S.) Weight: 14.9 lbs.	118.0—151.95 mc. Output: 25 watts up to 140.0 mc, 20 watts up to 151.95 mc. TSO'd.	Airline & military.
Transmitter, VHF	"	TA-21A	½ ATR (S.) Weight: 14.3 lbs.	118.0—135.95 mc. 360 channels. 25 watts output. TSO'd.	Airline & multi-engine business aircraft.
Transponder, ATC	Radio Corp. of America, Aviation Equipment Dept., 11819 W. Olympic Blvd., Los Angeles 64, Calif.	AVQ-40B, AVQ-60C	Designed in accordance with ARINC 532C.	AVQ-40B for use in 3-pulse s/s, AVQ-60C for use in both 2 and 3-pulse s/s environments.	Available with internal automatic altitude reporting, or will work with external altitude reporting unit.
"	Collins Radio Co., 855 35th St. N. E., Cedar Rapids, Iowa	621-2A	½ ATR. Weight: 26 lbs.	500 watts output.	Major airline aircraft.
"	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	714C-2			
"	"	814	½ ATR. (S.) Weight: 10 lbs.		General aviation unit.
"	"	714C-I	½ ATR (L) Weight: 25 lbs.	3-pulse s/s.	
Turn & slip indicator	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	3924	5¼" x 3¼".	4 minute turn.	Designed for inclined panel 20° from vertical.
Vapor cycle system	Carrier Air Conditioning Co., Carrier Pkwy., Syracuse 1, N. Y.		Varies with capacity requirements.		For refrigerating portable cargo compartments.
Vibrators, instrument panel	Safe Flight Instrument Corp., 4 Water St., White Plains, N. Y.		Weight: 0.8 lbs.	27.5 v. DC, 115 v. AC.	
Weather radar	Bendix Radio Div., Avionic Products, Towson 4, Md.	RDR-1D	Receiver/Transmitter: ½-ATR, 26.7 lbs. Synchronizer: ½-ATR, 23.0 lbs. Indicator: 4½ x 4½ x 12½, 13.5 lbs. Control: 2½ x 3½ x 5¾, 1.8 lbs. Antenna: 16 inch reflector, 15.0 lbs. 22" reflector, 25.0 lbs. 30" reflector, 27.0 lbs.	X-band: 150 mile range stabilized antenna; con-four circuitry; 120° scan on 22" & 30" antennas; 120° scan on 16" antenna. TSO'd.	Airline, military and multi-engine business aircraft. Bright display indicator optional at extra cost.
Weather radar	Collins Radio Co., 855-35th St., N.W., Cedar Rapids, Iowa	WP-103	48.9-51.0 lb. system weight based on choice of 12", 18" or 30" antenna and indicator.	20 kw minimum output. 320 va at 115 v. No DC required.	Mohawk Airlines.
Weather radar	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	890	Ind. weight: 12½ lbs. T/R ½ ATR (S), weight: 18½ lbs. Ant.—24", weight: 26 lbs. Ant.—12", weight: 16 lbs.		General aviation, plus airlines.
Weather radar, "C" band	Radio Corp. of America, Aviation Equipment Dept., 11819 W. Olympic Blvd., Los Angeles 64, Calif.	AVQ-10	Designed in accordance with Aeronautical Radio Characteristic 529. Weight: 125 lbs.	Display storage tube (day-light view) indicator available for either retrofit or new installations.	Currently used by approx. 11 U.S. and 20 international airlines.
Weather radar, "X" band	"	AVQ-20	Weight: 57 lbs.	Designed for use in aircraft where weight, space and power are at a premium.	Currently used by AAA, AAL, BNF, CEN, OZA, PCI, TTA, WCA, and business aircraft operators.
Weather radar, "X" band	"	AVQ-50	Weight: 40-45 lbs.	Light weight, transistorized system.	Available: January, 1962.



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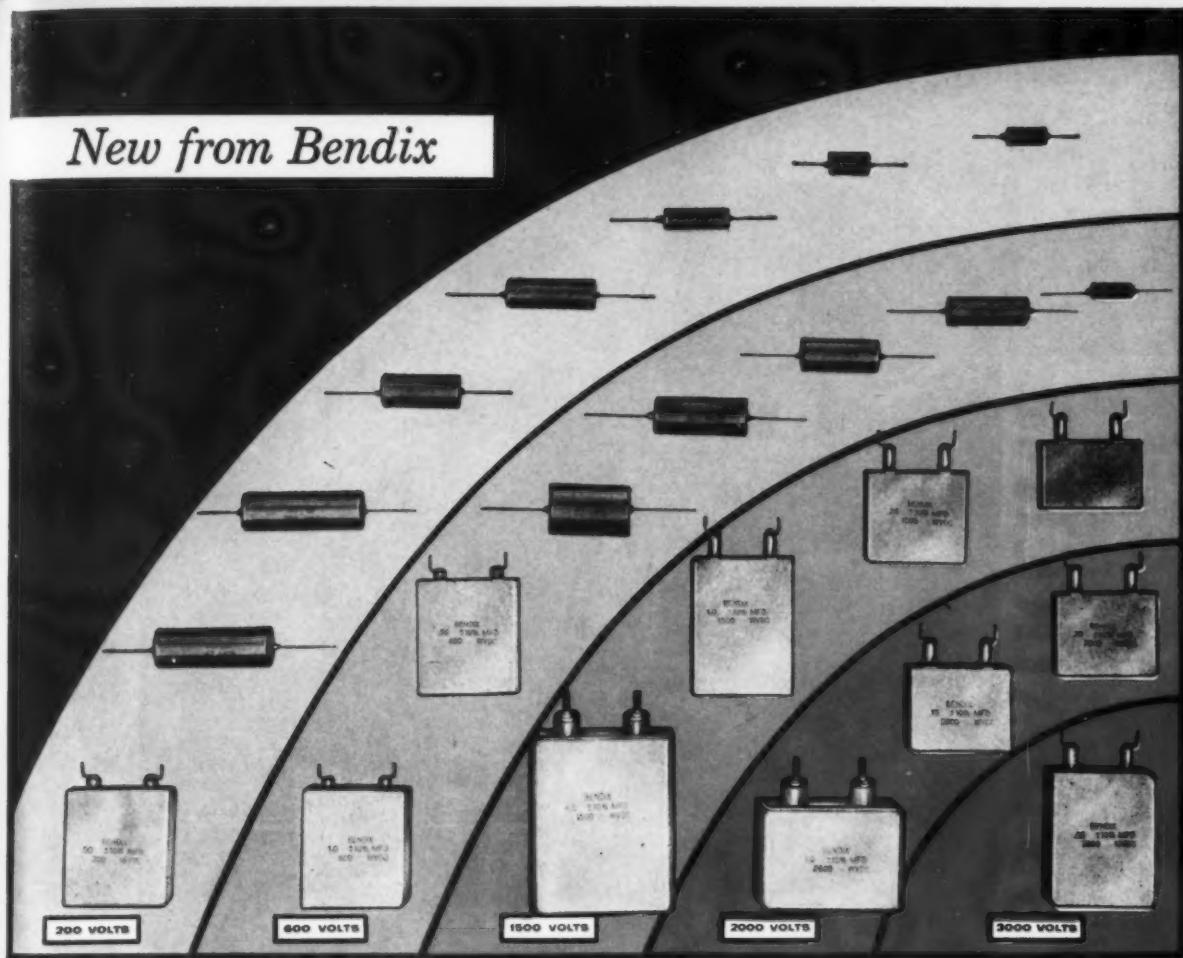
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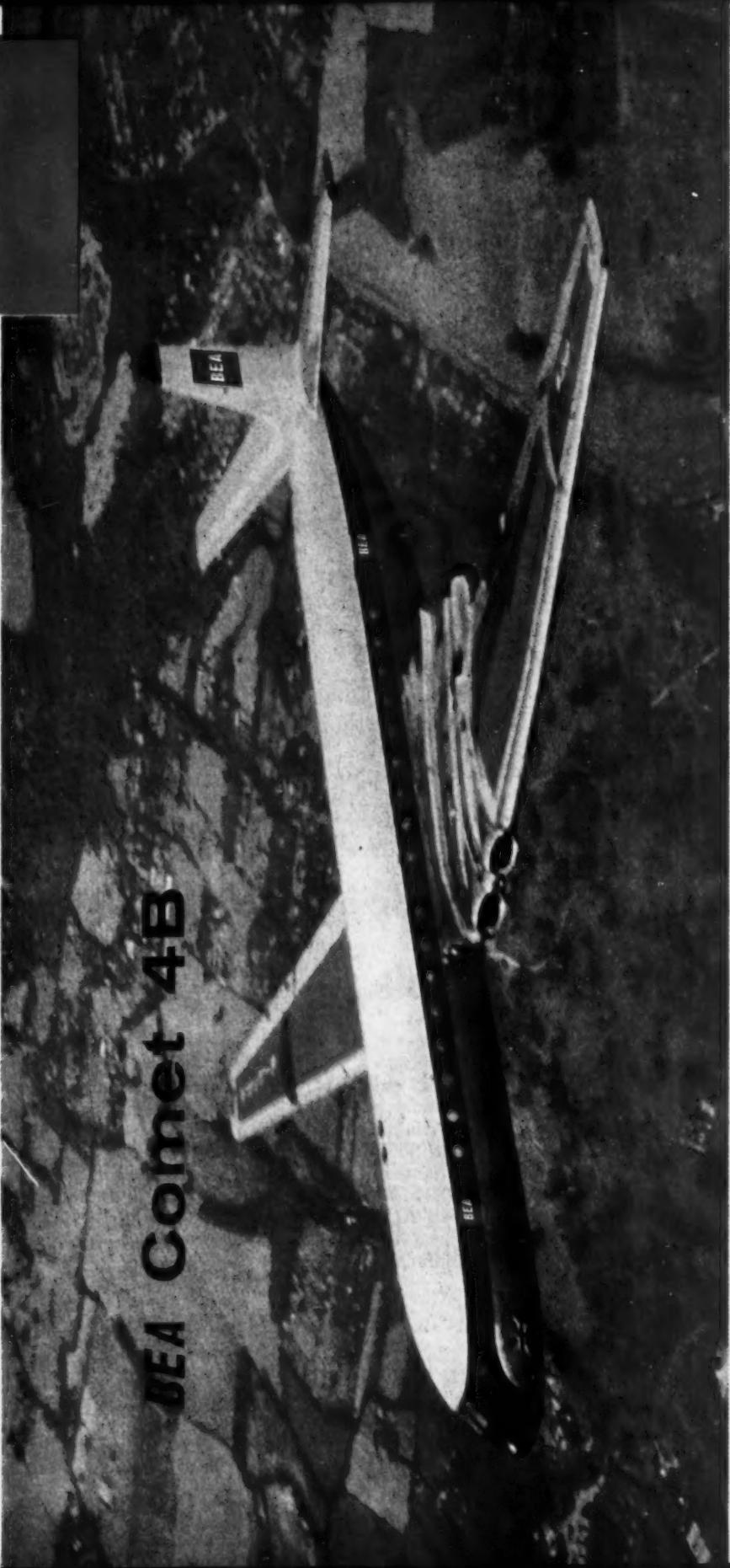


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November, 1914 . . . In an early raid, Avro 504's bomb German Zeppelin works at Friedrichshafen.

Early War Birds—THE AVRO 504

First appearing in 1913, this British biplane was manufactured by A. V. Roe in great numbers during World War I as a standard dual-control trainer and as a single-seater for home defense squadrons. Endowed with responsive and stable flying characteristics, the 504 had a top speed approaching 80 mph and a service ceiling of 13,000 feet with the 80-horsepower Gnôme rotary used in most models. Normal endurance was three hours.

Early in the war, the Avro 504 was also used successfully for reconnaissance and bombing in spite of its light construction and poor defensive arrangement (as an operational two-seater the armed observer sat forward). An outstanding example of this front line service occurred on November 21, 1914 when three 504's of the Royal Naval Air Service raided the German Zeppelin works at Friedrichshafen. Loaded with an auxiliary fuel tank in the observer's cockpit and four 20-pound bombs hung under the fuselage, they took off from Belfort, France, around

9:45 A.M. Led by Squadron Commander Briggs, the three Avros flew up the Rhine Valley, north of the Swiss border. After a flight of 125 miles, they approached the target and made their run in, "down on the deck" over Lake Constance, rising to about 700 feet for the bombing.

Flying back and forth over the Zeppelin works, the English pilots released their small bombs deliberately and effectively. The gas works were hit and exploded. Working sheds were damaged . . . and so was a hangared airship. Although taken by surprise, the German defenders managed to bring down Commander Briggs, who was captured and imprisoned. Flight Commander Babington and Flight Lieutenant Sippe, the other two British pilots, returned to Belfort about 2:00 P.M. Following the raid, the Germans assigned more men and guns to the air defense of Friedrichshafen. However, since Zeppelins never developed as a real threat, the Allies ignored the place for the duration of the war.



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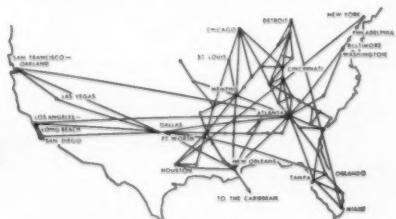
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Ground Support Equipment

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Aerostand	Weber Aircraft Corp., 2820 Ontario St., Burbank, Calif.	4	Working height: 4 ft. Weight: 126 lbs.	Rubber tired casters on two legs.	
"	"	10D, 10E	Height range: 3 to 10 ft. from ground. Weight: Approx. 300 lbs.	Two 8" heavy duty brake type swivel casters on front; two pneumatic wheels on rear.	
"	"	20A	Height range: 13 to 20 ft. from ground. Weight: Approx. 1400 lbs.	Four 12" heavy duty swivel casters with rubber tired wheels & spring loaded swivel locks. Towbar included.	
Actuator, electro-mechanical	Calco Mfg. Co., 205 Factory Rd., Addison, Ill.	C-3073	Actuator, 4.062 x 2.00"; valve, 5.750 x 4.750".	26VDC or 115VAC, 400 or 60 CPS. Unit weighs 3 lbs.	For use with portable & mobile servicing vehicles & air start carts.
Air conditioning systems, ground	Garrett Corp., AiResearch Mfg. Div., 9051 Sepulveda Blvd., Los Angeles 45, Cal.	CA 2-I	89" x 26" x 24", weight 375 lbs.	Vapor cycle air conditioner. Cooling capacity: 4 tons. Heating: 10KW. Flow: 770 CFM with input of 11 KW max.	Ground support.
Air freight unit	Cresci Aviation Equipment Co., Boulevard & Grape St., Vineland, N. J.	8 ton	Height when raised approx. 15 ft.	Body cannot be lowered onto or pushed into the cab.	
Baggage handling system	Lockheed Industrial Products, 1500 Northside Dr., N.W., Atlanta 18, Ga.		Container: 175 lbs., 75 cu. ft.; aircraft hardware, 230 lbs.	System utilizes containers, aircraft hardware, cart kits and forklift adapter.	For use in loading forward cargo compartment of 707, 720 & 727 transports.
Cargo hoist & bodies	Cresci Aviation Equipment Co., Blvd. & Grape St., Vineland, N. J.	3 ton, & ton, 9 ton	Height off ground in raised position approx. 13 ft.	Interchangeable when truck CA the same. Hoist won't collapse if hydraulic hoses burst.	SAS, EL AL Israel.
Cargolift	Allen Division, Houston Fearless Corp.	60-75	24" x 13'4" wd. Collapsed ht. 45"; extended ht. 122"; wt. 18,000 lbs.	Payload 16,500 lbs., 5" lat. shift, 2" roll.	CL 44D & any sideloading a/cf. Seaboard World, Flying Tigers.
Carriers, straddle	Clark Equipment Co.	Series 71, 81, 93, 95 and 128	8000 lbs. to 24,400 lbs. weight.	12,000 lb. to 40,000 lb. capacity.	
Carrier, van	"	Van carrier 500	59,500 lbs.	55,000 lb. capacity.	
Cart, baggage/cargo	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.		4' x 10'; weight: 810 lbs. 4' x 10'; weight: 1240 lbs.		
Cart, cargo	Bil-Jax, Inc., Wyse Rd., Archbold, Ohio	BC-5500	All sizes for all baggage, express & freight.		
Cart, air compressor	Accessory Controls & Equipment Corp., 805 Bloomfield Ave., Windsor, Conn.	ACE-370	92" long, 52" wide, 56" high. Weight: 2,530 lbs.	Provides 15 SCFM at 5000 psig, -45°F dewpoint.	Designed to eliminate use of nitrogen.
Cart, hydraulic filtering	REF Dynamics Corp., 393 Jericho Tpke., Mineola, N. Y.	HFC-1	41" high, 32" wide, 54" deep. Weight: 750 lbs. crated.	0-130 psig. 5-micron absolute, 2-micron nominal cleanliness.	Filters hydraulic systems. Servo valves, mfrs. & aircraft industry.
Cart, jet ground start	Accessory Controls & Equipment Corp., 805 Bloomfield Ave., Windsor, Conn.	ACE-150	182" long, 40" wide, 49" high. Weight: 5,400 lbs.	Jet starter, high pressure storage system. Dry air for charging struts and accumulators.	Pan American (all divisions), Air France, Pakistan, El Al Israel, Alitalia, Iberia & Philippine.
Cart, water methanol	Bil-Jax, Inc., Wyse Rd., Archbold, Ohio	WM 500			All types for all aircraft.
Compressor, air	Calco Mfg. Co., 205 Factory Rd., Addison, Ill.	C-7006	4 1/4 x 6 5/16 x 5 4/16. Weight: 6.75 lbs.	115v. AC—400 cps. 30 delivers/cfm at 45 psi. Continuous duty.	For pressurizing water systems or electrical cable and dessicator systems.
Door heaters, hangar	L. J. Wing Mfg. Co., Div-Aero Flow Dynamics, Inc., Linden, N. J.		10 sizes.	Capacities 315,000 to 1,310,000 BTU/hr.	For hangar door areas, when doors are open.
Duct heater assemblies, gas fired.	L. J. Wing Mfg. Co., Div-Aero Flow Dynamics, Inc., Linden, N. J.		6 sizes.	Capacities 320,000 to 1,200,000 BTU/hr.	For hangar heating.
Fire extinguishers, CO ₂	Ansul Chemical Co., 1 Stanton St., Marinette, Wis.	CD-2 1/2, CD-5, CD-10, CD-15, CD-20.	2 1/2, 5, 10, 15 & 20 lb. CO ₂ capacity.	UL listed; class B & C fires.	Hand portable.
Fire extinguishers, dry chemical	"	A-10-C, A-20-D, A-30-D, SP-A-10, SP-A-20, SP-A-30.	10, 20 & 30 lb. dry chemical capacities in cartridge operated and stored pressure models.	UL listed; class A, B & C fires. Hand portable.	For flammable liquid, electrical & ordinary combustible fire hazards.
"	"	SP-10, SP-20, SP-30.	10, 20 & 30 lbs. dry chemical capacity.	UL listed; class B & C fires.	Hand portable, stored pressure.
"	"		Dry chemical capacities from 150 to 2000 lbs.	Manually operable by one to four men.	For extra hazardous situations.
Fire extinguishing agents, special	"	"MET-L-X", "LITH-X", "MET-L-KYL", "C-D-C", "PURPLE K".		For combustible metals, lithium fires, aluminum alkyl fires, and as foam compatible agents, in aircraft crash fires.	
Fire extinguishers, water	"	WS-2 1/2, WPC- 2 1/2, WPC-5.	2 1/2 & 5 gal. capacities.	UL listed; air-pressurized and hand pump operated.	Will function properly at temperatures as low as -40°F, when anti-freeze chemical charge added.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Fire extinguishers, wheeled, dry chemical	Ansul Chemical Co., 1 Stanton St., Marinette, Wis.	150-B, 350-B, HF-350-B.	150 & 350 lb. dry chemical capacities.	UL listed; for fueling and flight line protection.	Approved for class B & C fires.
Fork lift trucks, electric	Clark Equipment Co., Battle Creek, Mich.	18 Models	29" x 54" to 51" x 96"; weights from 1,615 lbs. to 11,500 lbs.	1000 lb. to 10,000 lb. capacity.	
Fork lift trucks, gas powered	"	42 Models	28" x 56" to 136" x 346"; weights 2,565 lbs. to 93,600 lbs.	1000 lbs. to 70,000 lbs. capacity.	
Fuel cleanliness gauge	Bendix Filter Division, 434 W. 12 Mile Rd., Madison Heights, Mich.	20	12 x 11 1/2" thru 12 x 36 1/2"; weight: 24 thru 60 lbs.	100 thru 600 gpm in 100 gpm increments; 175 psi op. press.	Checks fuel for water and/or solids by monitoring fuel during transfer.
"	"	5	5 1/2 x 14" thru 5 1/2 x 24"; weight: 7 thru 9 lbs.	50, 75 & 100 gpm, 175 op. press.	"
"	"	1	3.75 x 7" thru 3.75 x 27"; weight: 2 thru 4 lbs.	5, 10, 15, 20, 25 gpm, 175 psi op. press.	"
Fuel system trainer, GE CJ605-23 engine	Burtek, Inc., 7041 E. 15th St., Tulsa 12, Okla.	Convair 990	3' x 6'	Animated, colored, painted line type.	For technician and mechanic training.
Gas turbine compressor	AiResearch Mfg. Co. of Arizona, 402 S. 36th St., Phoenix 34, Ariz.	GTC 85-90	26.5" x 26.9" x 39"; weight: 230 lbs.	Air flow: 132 lbs./min.	Pneumatic power for starting turbojet and turboprop engines and compressed air for turbine driven vapor or air cycle refrigeration systems and other low pressure pneumatic functions.
Gas turbine compressor/power unit	"	GTCP85-91	28.5" x 25.5" x 37.9"; weight: 260 lbs.	Air flow: 116 lbs./min. Electric power: 22.5 kva at .85 p.f. or 120 kva.	Dual purpose gas turbine supplying air and electrical power.
Gas turbine-driven ground support compressor	The Boeing Co., Industrial Products Div., P. O. Box 3955, Seattle 24, Wash.	502-128	46" x 27.5" x 27.7". Dry weight: 440 lbs.	56 psia, 450°F. air temp., 126 lbs./min. air flow.	Available in various packages: flyaway kit, baggage cart, trailer, panel truck. Commercial customers include 13 airlines.
Generator sets	Motor Generator Corp., Hobart Brothers Affiliate, Water St., Troy, Ohio	14 models with options		200 amps. to 1500 amps., current limiting or constant current available. Gas or diesel engines.	For piston, turbo or jet aircraft, system or component check out and starting. For use where DC power is required.
"	"	8 models with options		300 amps. to 1500 amps., current limiting, constant current available. Gas or diesel engines.	Same as above. Also light towing duty.
Ground power units	"	18 models with options		50 amps. to 1500 amps. Constant current or current limiting feature available.	"
"	"	5 standard models.		6.25 kva to 31.25 kva, variable speed adjustable drive.	For furnishing variable frequency to aircraft systems or components.
"	"	11 models, many options.		12.5 kva to 140 kva. Gas or diesel prime movers.	For turbo and jet aircraft starting, system and component check and maintenance where 400 cycle power is needed.
"	"	12 models with options.		30 kva to 125 kva. Gas or diesel prime movers.	For turbo and jet aircraft, system and component check. Unit installed in tractor for use where 400 cycle power is required.
"	"	11 models with options.		12.5 kva to 125 kva. Gas or diesel prime movers.	For turbo and jet aircraft, system and component check. For portable use where 400 cycle power is required.
"	"	17 models with options.		37.5 kva to 125 kva. Gas or diesel engines. Limiting towing duty.	For turbo and jet aircraft, systems and components where 400 cycle power is needed. Also light towing duty.
"	"	6 models with options.		37.5 kva to 125 kva. Diesel or gas engines. Choice of trucks.	For turbo and jet aircraft, systems and components where 400 cycle power is needed. Also light towing duty.
"	"	27 models with options.		37.5 kva to 145 kva. Electric motor prime movers.	For turbo and jet aircraft, system or component check out where 400 cycle power is necessary.
Ground movers	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	10040	334" x 177" x 48"; weight: 20,000 lbs.	Moves 500,000 lb. aircraft by transmitting drive power through aircraft wheels.	Customers include most aircraft mfrs. and operators in U.S. and in free countries abroad.
Heater, mobile, ground	Lucas Gas Turbine Equip., Ltd., Wood Top Works		6' x 4' x 5'.	400,000 BTU/hr.	Self-contained mobile space heater producing 120 lbs./min. of clean, heated air for pre-heating aircraft on ground.

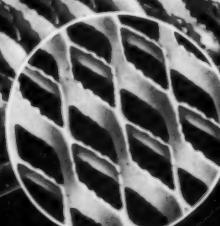
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- ★ Open space in excess of 55% of area for easy access of light and air.
- ★ No extra supports needed—channels are integral part of the material.
- ★ Self cleaning.
- ★ Cut and installed like lumber by your own maintenance force.
- ★ Low in original cost.
- ★ For balconies, no extra sprinkler heads needed.
- ★ Easy to stand on.
- ★ Cool in summer, warm in winter.

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

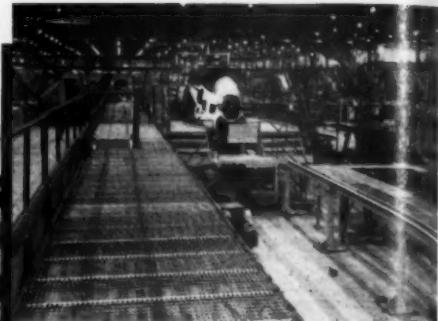
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Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

The **GLOBE COMPANY**

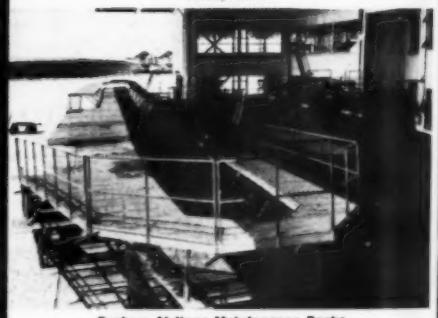
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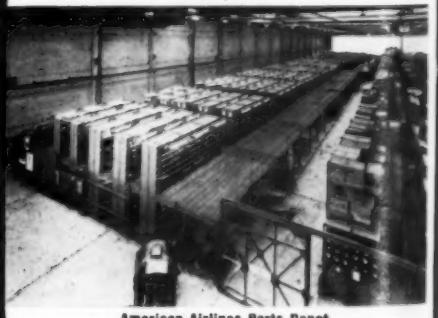
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NEWEST JET TRANSPORT / NEWEST ELECTRIC POWER SYSTEM

Advanced Westinghouse electric power systems featuring unique starter/generators have been selected for the new Boeing 727 jet transports.

The Westinghouse equipment will serve first as powerful jet engine starters, then operate as brushless a-c generators to supply the sleek transports with electric power.

This brushless starter/generator will utilize a rectifier assembly of high temperature silicon diodes, which have achieved outstanding performance on Boeing Jetliners

and major military aircraft. Silicon diodes are used instead of carbon brushes, commutators and slip rings . . . resulting in greater reliability—increased TBO and reduced maintenance costs.

Complete aircraft electric power systems and utilization equipment including starter/generators, generators, control panels, regulators, motors and transformer-rectifier units are all designed and built by the Aerospace Electrical Department, Lima, Ohio. You can be sure . . . if its

Westinghouse



PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Hoist	Garrett Corp., AiResearch Mfg. Div., 7851 Sepulveda Blvd., Los Angeles 45, Calif.		7" dia. x 16.88"; weight: 43.75 lbs.	115/200v. AC 400 cycle, cable velocity at 1400 lbs. = 15 ft./min.	Ground handling.
"	Whiting Corp., 157th & Lathrop Ave., Harvey, Ill.	B 2, B 3, B 1	Heights to 24'; weights to 4000 lbs.	Capacity to 3 long tons. Max. lift over floor: 20'.	Pan American, TWA, Eastern.
"	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	HO-AE, OP-H, DO-TRH, DO-FPH			For alternator, cable Rift, component and freon pack.
Hoist, monorail	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	4660	Length: 117"; width: 62.5"; height: 108"; weight: 560 lbs.; capacity: 8000 lbs.	Used for lifting jet engines and component sections during repair and assembly.	Used with JT-3, JT-4, CJ-805, Conway and Tyne.
Hydrant box	Garsite Products, Inc., Seaford, N.Y.	1459	20" diameter (inside) with 13" opening; depth to suit.		Designed for wheel loads of 150 psi (37,500 lb.). Usable for fuel hydrants, air, electric and water service.
Hydrant fueling servicer, turbo	"	1472	84" wide; 220" long; 70" high; weight: 13,000 GVW.	400 gpm. Dual wing servicer with booster pump, filter, separator, pressure controls, meters, hoses and nozzles.	
Hydrostairs	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	77, 135, 616, 255	Weights: 450, 875, 950, 1200 lbs.		
Jack, Axle	Regent Jack Mfg. Co., Inc., 11905 Regentview Ave., Downey, Calif.	5923	40 tons capacity	Ground clearance: 2". Proofload: 60 tons. Max. extended height: 22.5". 23 1/2 inch.	
Jack leveling	"	4953	2 tons	26 inch.	4450 psi.
"	"	2925R	5 tons	22 inch.	2820 psi.
"	"	4925	"	32 inch.	1670 psi.
Ladder, extension, counterwt. base	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	LA-25	Weight: 1500 lbs.		
Ladder, extension, counterwt. base only	"	LA-50	Weight: 3230 lbs.		
Ladder, extension, counterwt. base only	"	LA-40	Weight: 2580 lbs.		
Ladder, extension, counterwt. base	"	LA-34	Weight: 1580 lbs.		
Ladder, extension, spray tube	"	LA-25	Weight: 950 lbs.		
Ladder, extension, wide base	"	LA-34	Weight: 525 lbs.		
Ladder, extension, wide base	"	LA-34	Weight: 975 lbs.		
Ladder, fixed height	"	7 ft.	7 ft., Weight: 112 lbs.		
Ladder, fixed height	"	8 ft.	8 ft., Weight: 100 lbs.		
Ladder, fixed height	"	9 ft.	9 ft., Weight: 125 lbs.		
Ladder, service	"	12 ft.	12 ft., Weight: 200 lbs.		
Ladder, service	"	10 ft.	10 ft., Weight: 190 lbs.		
Ladder, step	Ballymore Co., Lincoln & Garfield Ave., West Chester, Pa.	From 1 thru 12 steps in standard line	Standard height to 114" in std line. 3 types of step tread available.	1-8 steps mounted on spring loaded casters. 8-12 steps on plat. casters with lock.	For aircraft maintenance.
Lift jacks & skids	Colson Corp., Elyria, Ohio	6712		Lift jack system.	
Lifts, mobile access	Ballymore Co., Lincoln & Garfield Ave., West Chester, Pa.	6 models	Max. platform heights to 35'. Minimum collapsed heights 5'6" to 10' on various models.	Hand or electric lifts, multiple stage, single cylinder type. 350 lbs. plat. cap.	For high level maintenance. Collapse for storage. Caster mounted for mobility.
Lift truck	Hyster Co., P. O. Box 4318, Portland 8, Ore.	Challenger 60-70-80-series		6000, 7000, 8000 lbs. capacity.	Cargo handling, general maintenance. Customers include American, TWA, Convair.
"	"	Challenger 150-200 series		Equipped with booms. Capacity of lift truck (without boom) 15,000-20,000 lbs. Net capacity varies with boom attachment.	Used on most commercial aircraft. Customers include: Pan American, American, UAL, TWA, Continental, Eastern, Northwest, Flying Tiger, some international airlines.
"	"	Challenger 40		4000 lb. capacity.	Used for passenger baggage handling (equipped with special baggage bin —Pan American) and air freight handling.
Lift truck, electric powered	Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa.	KSIAT3024W KSIAT4024W	41" x 105 1/2" x 7900 lbs. (weight includes battery). 41" x 105 1/2" x 8300 lbs. (weight includes battery).	Lifting capacity & turning radius: 49". Electric powered.	
Lift truck, gasoline powered	"	G5APCO40 G5P2-2024 KG5P1AT60 G3P-180 G5AC240 KG5IAT40 KG5IAT70 KG5IAT80 KG5IAT100	42" x 129 1/2" x 7800 lb. 33 1/2" x 104 1/2" x 4425 lb. 63" x 148" x 9600 lb. 95" x 142" x 24,100 lb. 40" x 118" x 7110 lb. 42 1/2" x 125" x 9800 lb. 42 1/2" x 128" x 9600 lb. 64 1/2" x 137" x 10,200 lb. 50 1/2" x 151 1/2" x 13,250 lb.	Lifting capacity & turning radius: 4000 lb.—85". 2000 lb.—75". 4000 lb.—115". 18,000 lb.—163". 4000 lb.—74". 4000 lb.—84". 7000 lb.—87". 8000 lb.—93". 10,000 lb.—104".	
Lube oil dispenser	Garsite Products Inc., Seaford, N.Y.	1046	42" x 96" x 40". Weight: 2000 lb. (full).	Cap.: 5-154 ppm, for lube oil, 100 gr. $\frac{1}{2}$ 120 by pneumatic displacement.	Includes non-drip nozzle, high speed wheels, parking brake. Available in stainless steel, monel, plain or coated steel.
Mobile ground service units	Garrett Corp., AiResearch Mfg. Div., 7851 Sepulveda Blvd., Los Angeles 45, Calif.	GPF 90, GPF 91, GPT 90, GPT 91	44" x 30" x 41". Weight: 650 lbs.	Provides pneumatic & electrical power for starting.	For starting turbine powered aircraft.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Passenger loading equipment, "JETWAY"	P. I. Steel Corp., 11,633 S. Alameda St., Los Angeles 2, Calif.	54/107 & 21/27			Used by United and Delta for passenger loading.
Passenger loading stands, adjustable	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	PS-MC	97" to 137". Weight: 2002 lbs.		
"	"	PS-MB	97" to 137". Weight: 1750 lbs.		
"	"	PS-MA	97" to 121". Weight: 1675 lbs.		
Passenger loading stands, adjustable, self propelled	"	PS-SP	Weight: 4300 lbs.		
Passenger loading stands, adjustable stairway portable DC-4 & 1049	"	PS-PF			
Platform, industrial	Celson Corp., Somerville, Mass.		Portable & stationary capacities, 2000 to 20,000 lbs.		Elevator type.
Platforms, hydraulic lift, work	Ballymore Co., Lincoln & Gar- field Ave., West Chester, Pa.	3 standard models & to customer specs.	3' x 8' platform size 5' or 10' stroke collapsed height normally 5'.	Scissor type hydraulic lift. Hand, electric, or battery power. 800 lbs. capacity.	Mobile on casters for maintenance where large adj. level working surface is required.
Power pack, auxiliary	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	2410	37" x 13". Weight: 80 lbs.	3000 psi—2.5 hp.	Customers include most aircraft mfgs. and opera- tors in U.S. and in free countries abroad.
Power Supply, portable hydraulic	Flight Support Div.-Pacific Airmotive Corp., 11,248 Playa Court, Culver City, Calif.	TE-7221	40" x 60" x 108". Weight: 3000 lbs.	20 gpm at 3000 psi; 11 gpm at 500 psi; 45 gal. reservoir provided to supply sufficient hydraulic fluid for testing, filling & flushing complete A/C systems.	Customers: Continental & TWA.
Stairs, passenger loading ramp	Bil-Jax Inc., Wyse Rd., Archbold, Ohio	SRS300	Any stair width or plat- form fixed height.	Manually operated.	Fixed height, not adjustable.
"	"	TR5200	"	Truck mounted, self propelled.	Platform, step & stabilizers hydraulic operated.
"	"	PR120	"	Electric, self propelled.	Operated and controlled at base.
"	"	TR-120	"	Truck mounted, self propelled.	Parallellogram type step & platform height adjust- ment, hydraulic controls.
"	"	PR5200	3 ft. to 5 ft. wide stairs, any platform height.	Manually propelled.	Hydraulic pump operated.
"	"	ERS200	Any stair width & plat- form height adjustment required.	Gas engine driven. Self propelled.	Electric hydraulic pump operated, driven & con- trolled at top platform or at base.
Starter, air turbine	AiResearch Mfg. Co. of Ari- zona, 402 S. 35th St., Phoenix, 34, Ariz.	ATS100-135	10.5" x 8". Weight: 23.5 lbs.	60 psia/400°F.	Lockheed Electra.
"	"	ATS100-83	Envelope length and width: 9.9" x 8.3". Weight: 23.7 lbs.	36 psia/350°F.	Boeing 707.
"	"	ATS100-103	9.9" x 8". Weight: 21 lbs.	45 psia/340°F.	Douglas DC-8.
"	"	ATS100-110	9.9" x 8". Weight: 22 lbs.	47.5 psia/1000°F.	Convair 880 & 990.
"	"	ATS100-127	10.2" x 8.6". Weight: 24 lbs.	500 psia/40°F.	Sud Aviation Caravelle.
"	"	ATS100-129	8.25" x 8". Weight: 24.0 lbs.		Boeing 720B.
"	"	ATS100-131	13.2" x 8". Weight: 25.5 lbs.		Convair 540.
Towbars	Bil-Jax, Inc., Wyse Rd., Archbold, Ohio	T8	Any size		For any type aircraft.
Towbars	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	C-82	Weight: 60 lbs.		
"	"	C-46	Weight: 180 lbs.		
"	"	DC-4, DC-4,	Weight: 75 lbs.		
"	"	CV-240/340/440	Weight: 90 lbs.		
"	"	C-47 & DC-3	Weight: 225 lbs.		
Tractor, gasoline powered	The Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa.	G10P30CF	62½" x 102½" x 4650 lbs.	Lifting capacity & turning radius: 3000±122".	
Traitor, towing	The Frank G. Hough Co., Seventh & Sunnyside Aves., Libertyville, Ill.	TD-65LA	124" x 45" x 36".		
"	"	T-150 & T-150D	135" x 96" x 54". Weight: approx. 22,500 lbs.	4500 lbs. DBP on dry concrete. Two-wheel drive, diesel, automatic trans. 15,000 lbs. DBP on dry concrete. Two-wheel drive, gasoline or diesel power- shifted trans.	
"	"	T-120F & T-120FD	143" x 80" x 60". Weight: approx. 13,700 lbs.	12,000 lbs. DBP on dry concrete. Four-wheel drive, gasoline or diesel, manual trans.	
"	"	TD-80	124" x 45" x 36". Weight: approx. 11,000 lbs.	8000 lbs. DBP on dry con- crete. Two-wheel drive, diesel, automatic trans.	
"	"	T-30 & T-30A	103½" x 55" x 57". Weight: approx. 4820 lbs.	3000 lbs. DBP on dry con- crete. Two-wheel drive, gasoline, manual or auto- matic trans.	
"	"	T-40 & T-40A	103½" x 64" x 57". Weight: approx. 6230 lbs.	4000 lbs. DBP on dry con- crete. Two-wheel drive, gasoline, manual or auto- matic trans.	
"	"	T-300SL	235½" x 96" x 88" (over optional cab). Weight: approx. 40,000 lbs.	30,000 lbs. DBP on dry concrete. Four-wheel drive, gasoline, automatic trans.	
"	"	T-180F	177½" x 96" x 88" (over optional cab). Weight: approx. 25,000 lbs.	18,000 lbs. DBP on dry concrete. Four-wheel drive, gasoline, automatic trans.	

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Tractor, towing	The Frank G. Hough Co., Seventh & Sunnyside Aves., Libertyville, Ill.	T-225SL T-50L & T-50LA	235½" x 96" x 88". Weight: approx. 32,000 lbs. 105" x 66" x 57". Weight: approx. 7400 lbs.	22,500 lbs. DBP on dry concrete. Four-wheel drive, gasoline, automatic trans. 5000 lbs. DBP on dry con- crete. Two-wheel drive, gasoline, manual or auto- matic trans.	
"	Clark Equipment Co.	Clarkat 26 Clarktor 80 Clarktor 300 Clarkat 20 Clarkat 7 Clarktor 20 Clarktor 30 Clarktor 50	39" x 68" 69" x 107" Weight: 10,000 lbs. 94" x 173" Weight: 40,000 lbs. 39" x 68" 29" x 63" Weight: 1850 lbs. 54" x 97" Weight: 3300 lbs. 54" x 97" Weight: 4200 lbs. 54" x 97" Weight: 6000 lbs.	2600 lbs. capacity. 8000 lbs. capacity. 30,000 lbs. capacity. 2000 lbs. capacity 700 lbs. capacity, drawbar pull. 2000 lbs. capacity. 3000 lbs. capacity. 5000 lbs. capacity.	
Trailer, engine transportation	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	3060 3060C	132" x 85.4" x 34". Weight: 750 lbs. Capacity: 8000 lbs. 132" x 77" x 29.5" (min.), 43.3" (max.). Weight: 850 lbs. Capacity: 8000 lbs.	Air truck & surface trans- portation of jet engines. " " "	Used with JT-3, JT-4, CJ-805—Conway & Tyne.
Trailer, installation, removal	"	1030 4000A 4100 6200	95" x 61" Weight: 1320 lbs. 126" x 72" Weight: 2600 lbs. 148" x 72" Weight: 3400 lbs.. 154" x 94" Weight: 7000 lbs.	3000 lbs. capacity. 8000 lbs. capacity. 10,000 lbs. capacity. 15,000 lbs. capacity.	Customers include most aircraft manufacturers and operators in U.S. and in free countries abroad.
Trailer, jet ground start	Accessory Controls & Equipment Corp., #05 Bloomfield Ave., Windsor, Conn.	ACE-103	108" x 60" x 69". Weight: 6150 lbs.	Jet starter high pressure air storage system with compressor dry air.	Air India, TWA, Air France, National Airlines, South African Airways, American Airlines, Con- tinental Airlines.
Trailers	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	1200 3000 6400	90" x 66". Weight: 450 lbs. 90" x 58". Weight: 500 lbs. 106" x 84". Weight: 3450 lbs.	3000 lbs. capacity. 8000 lbs. capacity. 15,000 lbs. capacity.	Customers include most aircraft manufacturers and operators in U.S. and in free countries abroad.
Trainer, electrical power system	Burtek, Inc. 15th St. at 73rd Ave., E. Tulsa 12, Okla.	DC-8	6' x 8'.	Animated, back-lighted, motor driven.	For air crew and tech- nician training.
Trainer, aileron control system	"	Lockheed 188 Electra	3' x 6'.	Animated, back-lighted, motor driven. Hydraulic.	For air crew and tech- nician training.
Trainer, hydraulic system	"	Caravelle	5' x 8'.	Animated, back-lighted, motor driven.	For air crew and tech- nician training.
Trainer, spoiler & aileron system	"	Convair 880	6' x 9'.	"	For air crew and tech- nician training.
Truck, dish Truck, dolly	"	6406 6641	18" x 24" standard.	Painted or stainless steel. Wood and steel dolly trucks.	All models kitchen trucks.
Truck, lift bed	Nordco Products, Inc., 15917 Strathern St., Van Nuys, Calif.	211 HL	Bed size 72" wide, 125" long 28" high when down & 84" when up.	2000 lb. capacity. Max. speed 8 mph. Operates from storage batteries. Built in chargers. Elec- trically operated.	Baggage & freight loader. For commissary use.
Truck, electrically powered, industrial flatbed	"	336	Cargo area: 4 ft. wide & 6 ft. long.	1000 lbs. capacity. 4½ hp DC Markefser motor, max. speed 22 mph. Electrically operated, flat bed.	For baggage & freight hauling.
Truck, electric powered	Clark Equipment Co.	22 Models	Weights: 950 lbs. to 4950 lbs.	1500 lbs. to 10,000 lbs. capacity.	
Truck, hand	The Colson Corp., Elyria, Ohio	6075	Height: 46".	Capacity to 1000 lbs.	
Truck, oxygen tank	The Colson Corp., Elyria, Ohio	6585		Oxygen or other gas mobility.	
Truck, passenger stand	Aircraft Equipment Co., 4050 N. W. 28th St., Miami 42, Fla.	PS-TM	Weight: 6110 lbs.		
"	"	90-10	20'10" lg & 7' wd. Col. ht. 2'9". Ext. ht. 8'4". Wt. 9000 lbs.	Payload 6000 lbs.	
Vehicle, air conditioning & heating	Accessory Controls & Equipment Corp., #05 Bloomfield Ave., Windsor, Conn.	ACE-400	213" x 94" x 94". Weight: 15,300 lbs.	Cooling 100°F to 40°, 500,000 BTU/hr. heating. Heating 0°F alt. to 100°F, 500,000 BTU/hr. No com- bustion heater.	Pan American, Bristol Aero Industries, Cunard Eagle Airways, Nassau Air Dis- patch Service.
Vehicle, jet ground start	"	ACE-501	237" x 97" x 81". Weight: 14,570 lbs.	Jet starting unit. 500 psig storage system. Garage type compressors, driven by Ford 4 cylinder engine.	Pan American, Bristol Aero Industries.
Wheel chocks	Bil-Jax Inc. Wyse Rd., Archbold, Ohio	WL-7000	All sizes and all types for all aircraft.		



WHAT? MOP A CARPET?

That's the "spot" cleanability Eastern Air Lines needed . . . and that's what they got with "Royal" of Caprolan. Satisfying unusual performance requirements is second nature to carpets of Textured Caprolan® filament nylon . . . and "Royal" by Collins & Aikman is clearly no exception. A specially engineered transportation carpet, "Royal" met the airline's extraordinary cleaning needs in a brilliantly effective way. Even more importantly, Eastern's own

carpet comparison tests, including 100 commercial launderings, proved: 1. "Royal" cleans more easily, more uni-

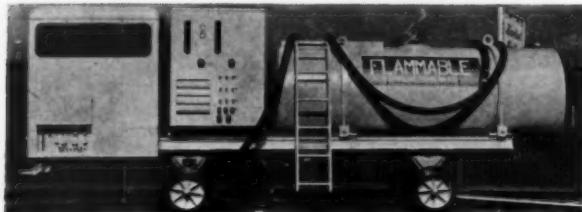
formly than any other carpet Eastern had ever used or tested before. 2. "Royal" does not shrink . . . holds to exact size specifications. 3. "Royal" Caprolan pile maintains its texture and character better . . . is unsurpassed for wear . . . colors remain true. No wonder Eastern now specifies "Royal" of Caprolan for all their new and refurbished passenger planes. This is experience you'd do well to profit by. Contact Collins & Aikman and find out about "Royal"—today!



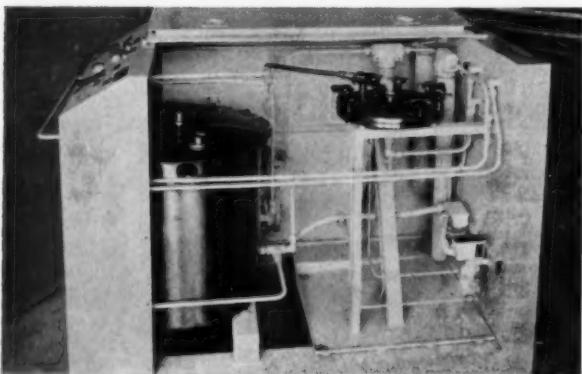
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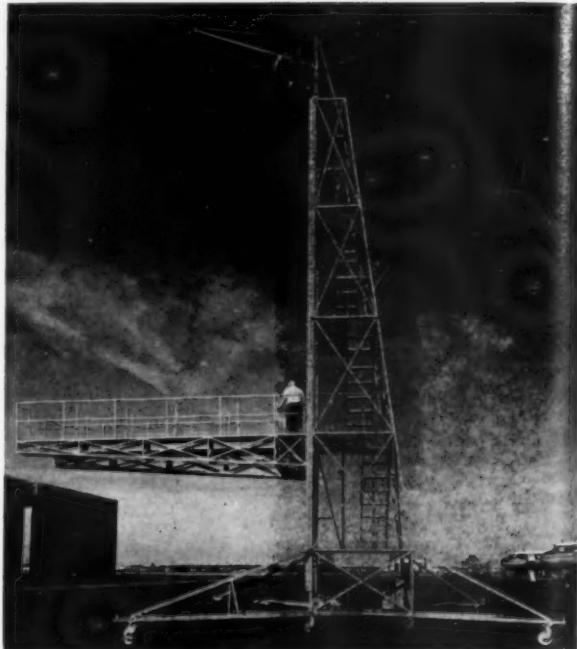
Maintenance/Overhaul Equipment



JET run-up/test unit (*Air Logistics*)



HYDRAULIC filter unit (*REF Dynamics*)



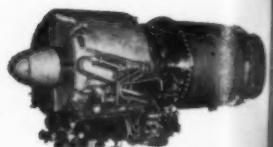
TAILSTAND (*Aircraft Equipment Co.*)

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Access ladder, tail fin	Bil-Jax Inc. Wyse Rd., Archbold, Ohio	RAL-600	All sizes for various heights		
Aircraft engine dynamometer	Clayton Manufacturing Co. 401 N. Temple City Blvd., Box 550, El Monte, Calif.	T22-6000-TP	18' x 8½" x 6½". Weight: approx. 25,100 lbs.	For testing turboprop engines. Capacity: 4000 hp at 975 to 1600 rpm.	
"	"	T22-5000-AC	17' x 15' x 7½". Weight: approx. 25,700 lbs.	For aircraft piston engines. Capacity: 5000 hp at 1000 to 1600 rpm.	
"	"	T22-5000-TP	17' x 8½" x 6½". Weight: approx. 24,300 lbs.	For testing turboprop engines. Capacity: 5000 hp at 1000 to 1600 rpm.	
Analyser, sound	Industrial Acoustics Co., Inc. 341 Jackson Ave., New York 54, N. Y.	ISA	9" x 3" x 6". Weight: 4 lbs.	Battery powered.	For area checks of sound level for personnel protection.
Blind bolt tooling	Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.	BB series	5/32" diameter through 1/2" diameter.	Stainless steel.	All purpose repair fastener.
Calibrator diffuser & mechanism	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	I3707-I-B	31" x 15" x 20". Weight: 70 lbs.	Press. ranges: 10-30" of water. 10-220 millimeters. 0-360 millimeters. Mineral seal oil—density of .829.	Designed to test rate-of-climb indicators.
Capacitance bridge, automatic	Simmonds Precision Products, Inc., Tarrytown, N. Y.	387011	21.75" x 10" x 10.50" Weight: 35 lbs.	Range: 0-100 mrf. 115 v, 400-cycle, 32.0 watts.	Ground support & over-haul shops.
Cart, refrigeration servicing	"	ACE-330	68" long, 46" wide, 64" high. Weight: 2250 lbs.	For checking aircraft air-conditioning systems or industrial systems for Boeing 707 & DC-8. Portable.	Pan American & Canadian Pacific.
Check valve, skydrol service	Kohler Co., High St., Kohler, Wisc.	K-1248-4, -6, -8, -10 K-1270-4, -6, -8, -10 K-1212-4, -6, -8, -10, -12		3000 psi 3000 psi 1500 psi	Boeing 707, 720. "
Cleaners, steam	Clayton Manufacturing Co. 401 N. Temple City Blvd., Box 550, El Monte, Calif.	#280 & CA-628	50" x 27" x 41". Weight: 2200 lbs.	Various models produce from 60 gph to 600 gph. Oil or gas fired.	Various models in use in airline maintenance bases.
"	"	#150	38" x 28" x 43". Weight: 550 lbs.	"	"
"	"	#120	42" x 18" x 36". Weight: 450 lbs.	"	"

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Cleaners, steam	Clayton Mfg. Co., 401 N. Temple City Blvd., Box 550, El Monte, Calif.	#40	42" x 19" diameter. Weight: 200 lbs.		
"	"	S-809 Hydro	8½" x 7" x 3½". Weight: 15 lbs.	Steam operated, 170 gals. per hr.	
"	"	#200	47" x 35" x 34". Weight: 565 lbs.	Various models produce from 40 gph to 600 gph. Oil or gas fired.	Various models in use in airline maintenance bases.
Cleaning flushing stand, oil cooler	Flight Support Div.-Pacific Airmotive Corp., 11248 Playa Court, Culver City, Calif.	TE-7240	7½" x 120" x 60". Weight: 3000 lbs.	Air-35 cfm at 100 psig; steam-10 lb. per hr.; electrical 9 kva, 3-phase.	Stand applicable to KC-135 & other aircraft.
Cleaning machines	Magnus Chemical Co., Garwood, N. J.	2 to 5	Load capacity up to 1000 lbs.		Reciprocating & general haul. Wheel & landing gear. Accessory over-haul. Seat belts. Teletype.
Compressor	Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.	15HGP	76" x 60" x 48". Weight: 1700 lbs.	15 cfm, 3500 psig air or nitrogen, portable, gasoline or engine driven.	Used by American, United & Pan American Airlines.
"	"	415HES	51" x 42" x 31". Weight: 960 lbs.	15 cfm, 4000 psig air and/or nitrogen. Electric driven.	Stationary installations. Testing, maintenance.
"	"	51SHES	63" x 34" x 33". Weight: 1200 lbs.	15 cfm, 6000 psig air, nitrogen or helium. Electric driven.	Gasoline or electric driven. Stationary or portable.
"	"	80HEP	148" x 88" x 67". Weight: 7800 lbs.	70-150 scfm, 0-8500 psig air, nitrogen or helium. Electric driven.	Wherever high pressure gases are required.
"	"	80HES	108" x 78" x 68". Weight: 8300 lbs.	40-150 scfm, 0-8500 psig air, nitrogen or helium. Electric driven.	Maintenance shops, testing.
Crack detector, eddy current	Magnaffux Corp., A Sub.-General Mills, 7300 W. Lawrence Ave., Chicago 31, Ill.	ED-500 Magnatest unit	15½" x 8" x 11". Weight: 16 lbs.	Probe type unit to operate from 110/60/1 AC consuming 42 watts. 15 min. warm-up. Portable.	Used for ferrous & non-ferrous metals to detect cracks, sort of hardness, heat treat, alloy, conductivity.
Cylinder honing machine	Vaper Blast Mfg. Co., 3025 W. Atkinson Ave., Milwaukee 9, Wisc.	D129 spec. cyl. hon. machine	4' x 4' x 10'. Weight: 3500 lbs.	Requires compressed air, elect., water, exhaust duct.	Used for overhaul cleaning or recip. aircraft.
Desealing machine, fuel tank	Turce Products, Inc., 24600 S. Main St., Wilmington, Calif.	10	24' long, 7' wide, 8' high. Weight: 10,000 lbs.	Completely mobile with sufficient capacity & pressure to simultaneously deseal all tanks on any commercial aircraft.	Designed to effectively remove all types of aircraft fuel tank sealants.
Dollies, engine maintenance	Aircraft Equipment Co., 4050 N. W. 28th St., Miami 42, Fla.	DO-HF, DO-4EIS, DO-JET, DO-4FLA, DO-FPH, DO-JETH, DO-4EJB	Various weights.		For holding, shipping, jet engines and components.
Dollies, engine test cart	Clayton Manufacturing Co., 401 N. Temple City Blvd., Box 550, El Monte, Calif.	Designated by engine make.	8½" x 5" x 6½". Weight: Approx. 5700 lbs.	For pre-mounting & inter-connecting engine. Automatically couples with engine systems in test cell when engine is moved into test position.	
Dollies, jet engine	Garsite Products Inc., Seaford, N. Y.	1514	60" wide, 10'6" long, 26½" high. Weight: 445 lbs.		For air transport, handling & storage of JT-3 & JT-4
Dollies, aircraft maintenance	Aircraft Equipment Co., 4050 N.W. 28th St., Miami 42, Fla.	DO-4W-3 and 10 other models	Weights varying from 249 to 1100 lbs.		Produced for all current jets and turboprops.
Dry honer	Vacu-Blast Co., P. O. Box 885, Belmont, Calif.	Mark IIP	80" wide x 32" deep x 120" high. Weight: 2000 lbs.	Will handle abrasives 180 mesh to 5000 mesh.	Aircraft maintenance.
"	"	Mark IIP	56" wide x 24" deep x 73" high. Weight: 880 lbs.	Will handle abrasives 180 mesh to 5000 mesh.	"
Engine container, lightweight	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	2810A	212" length, 64" width, 63" height. Weight: 510 lbs. Capacity: 6000 lbs.	Air transportation & storage of jet engines.	JT-3 & JT-4 engines.
"	"	2800A	193" length, 64" width, 63" height. Weight: 470 lbs.	Air transportation & storage of jet engines.	CJ-805 engine.
Engine, run-up & test system	"	12000C	Capacity: 4000 lbs. 222" x 62" x 84". Weight: 3750 lbs.	Provides safe, efficient means of carbo-blasting jet engines. Jet engine test capability in mobile unit.	Customers include aircraft manufacturers & operators in U.S. and in free world abroad.
Filter combination, two-micron	Bendix Filter Div., 434 W. 12 Mile Rd., Madison Heights, Mich.	2670	3" x 12½" x 24". Weight: 23.5 lbs.	Rated op. press. 3000 psi. Rated filtration: 2-micron nominal, 5-micron positive. Flow rate: 20 gpm with MIL-H-5606/150F.	For hyd. & pneu. test stands; external fluid power sources.
Fire director ground tester	Pyrotector, Inc., 349 Lincoln St., Hingham, Mass.	30-502	14½" x 7" x 7". Weight: 6 lbs.	Voltage, 20v. DC. Life: indefinite.	
Fuel test stand, universal	Flight Support Div.-Pacific Airmotive Corp., 11248 Playa Court, Culver City, Calif.	TE-7156	14' x 15' x 7'. Weight: 12,000 lbs.	Powered by 125 hp reliance drive motor. Fuel flow capacity: 44,000 pph. Pressures up to 22 psi.	Pacific Airmotive & Grumman. Adaptable to testing all jet fuel system accessories of 20,000 lb. thrust.



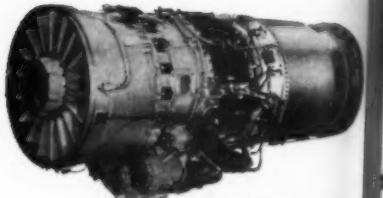
PT6 (500 Shaft HP)



J60/JT12 SERIES (3,000-3,300 Lb.)



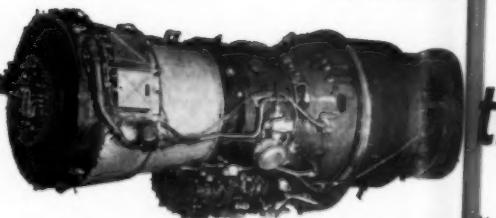
JFTD-12 (4,050 Shaft HP)



J52/JT8 (8,500 Lb.)



JT10 (10,000 Lb.)

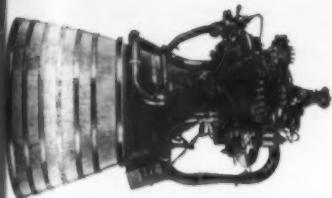


J57/JT3C SERIES (12,000-13,500 Lb.)

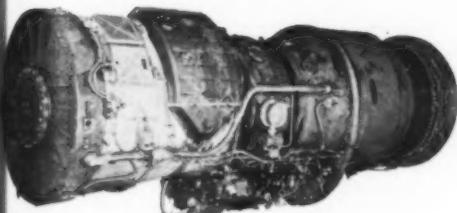


JT8D (14,000 Lb.)

Power



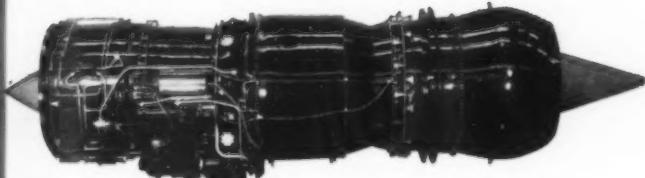
LIQUID HYDROGEN ROCKET ENGINE LR-115 (15,000 lb.)



JT5/JT4A (16,800-17,500 lb.)



TF33/JT3D SERIES (17,000-18,000 lb.)



J58/JT11 (30,000 lb. class)

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PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Gas purification system	Robbins Aviation, Inc., 2350 E. 38th St., Los Angeles 58, Calif.	RAF D4B series	20" high x 38" long x 5" deep. Weight: 200 lbs.	Up to 12,000 psi operating pressure & 550 scfm flow rate. -100° dew-point & less than 1 ppm/v hydro- carbons.	Test equipment, jet engine starters, pneumatic charging systems. Disposable cartridge.
Generator, sine wave	General Electric Co., Instrument Dep't, 40 Federal St., West Lynn, Mass.	2CM9ABCY9	Weight: 2.1 lbs.	Output: sine wave voltage with amplitude proportional to speed. Combines standard tech. generator with magnetic pick-up.	Compatible with electronic frequency measuring equipment for flight test, test cell, etc.
Hoist, jet engine	Regent Jack Manufacturing Co., Inc., 11905 Regentview Ave., Downey, Calif.	H1001	Capacity: 8000 lbs.	Clearance: 13'2"; proof-load: 13,400 lbs.; net weight: 940 lbs.	
"	"	H-2001	Capacity: 8000 lbs.	Clearance: 21'9/4"; proof- load: 12,000 lbs.; net weight: 1800 lbs.	
Hydraulic test bench	Flight Support Div.-Pacific Airmotive Corp., 11248 Playa Ct., Culver City, Calif.	TE-7207	83" x 129" x 96". Weight: 4000 lbs.	Water: 30 gpm at 850F. Electrical: 50 KVA, 3-phase (280 vac). Hydraulic: 24 gpm at 3000 psig, 14.3 gpm at 50 psig, hydrol & mill oil.	Sold to American & Lufthansa airlines. Applicable to DC-8, 707, 880 & 980.
Igniter tester	Lodge Plugs Ltd.			Suitable for testing high energy igniters fitted to all British engines.	
Jet engine agr-a-shell dispenser	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	2750	78" x 51" x 46". Weight: 550 lbs.	Provides safe, efficient means of carbo-blasting jet engines. Provides complete jet engine test capability in mobile unit.	Customers include aircraft mfrs. & operators in U.S. and in free countries abroad.
Jet engine blade finishing machine	Vapor Blast Manufacturing Co., 3025 W. Atkinson Ave., Milwaukee 9, Wis.	D570 jet blade finishing machine.	6' x 6' x 8'. Weight: 4000 lbs.	Compressed air, elect., city water, exhaust duct.	Used for cleaning & finished jet turbine blades, all sizes.
Jet engine test equipment, portable	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	12,000C	122" x 58" 84". Total weight of complete system: 3700 lbs.	Test all jet engines up to 33,000 lbs. thrust.	Check out engines before & after tear-down & assembly.
Liquid honing machine	Vapor Blast Manufacturing Co., 3025 W. Atkinson Ave., Milwaukee 9, Wis.	CS30	2' x 2' x 2'. Weight: 40 lbs.	Requires compressed air at 90 psi, 25CFM.	Single-cavity aircraft spark plug cleaner for firing & barrel ends.
Magnetic compass calibration equipment	Sperry Phoenix Co., Div.-Sperry Rand Corp., Phoenix 27, Ariz.	MC-I	Portable for line use.	For calibration of mag- netically slaved aircraft gyro compass systems.	Available on order.
Magnetic particle test unit	Magnaflex Corp., A Sub.-General Mills, 7300 W. Lawrence Ave., Chicago 31, Ill.	Type KROS-4— Magnaflex unit	8'4" x 57 1/2" x 56 1/4". Weight: 3500 lbs.	Current rating: 6000 am- peres full wave DC. Auto- matic demagnetization.	For use between flights to detect fatigue cracks & other defects in critical areas.
Monitor, VOR	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	477A	17 15/32" x 19" x 14 1/2". Weight: 77 lbs.	Includes ground checking.	
Plastic film	Minnesota Mining & Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn.				Used for emblems & markings by Eastern, American, TWA, United, Northwest Mohawk & on all Boeing 707's. Fluorescent "Scotchcal" film used by Allegheny and Avianca.
Playback equipment, maintenance	Royston Instruments Ltd., Canada Rd., Byfleet, Surrey, England	DP/7	3 racks, each 4' x 19".	Equipment for simultaneous automatic processing & printout of data from CMM series recorders.	This unit is intended for main base data processing.
"	"	LMC	2 racks, each 4' x 19".	Equipment for automatic processing & printout of any 45 parameters from CMM series recorders.	This unit is intended for line maintenance trouble shooting at outlying stations.
Recording equipment, maintenance	"	CMM/7D/60	2 full I ATR cases. Weight: 62 lbs.	Records FAA mandatory channels plus 246 mainte- nance parameters. Duration of record: 60 hrs.	Meets FAA TSO C.51 Type I requirements.
"	"	CMM/7S/60	1 full I ATR case & one unit. Weight: 62 lbs.	Records FAA mandatory channels plus 246 mainte- nance parameters. Duration of record: 30 hrs.	This record is automatically ejectable & contains a flotation & recovery beacon meeting TSO C.51 Type III requirements.
"	"	CMM/3D/60	1 full I ATR case & one 1/2 ATR case. Weight: 50 lbs.	Records FAA mandatory channels plus 64 mainte- nance parameters. Duration of record: 60 hrs.	Meets FAA TSO C.51 Type I requirements.
Scaffold stand, tall work	Bil-Jax Inc., Wyse Rd., Archbold, Ohio		10' x 52' x 42'.	Two units are used on each side of tall of air- craft & tied together at rear.	For use on DC-8, 707, Lockheed Electra & most aircraft tail assemblies.
Sheeting, reflective	Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.				Emblems & safety markings: All Northwest ground equipment & trucks; PAA aircraft & ground equipment.
Shipping stand, engine	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	3140	132" length, 52" width, 31.5" height. Weight: 430 lbs. Capacity: 6000 lbs.	Lightweight shipping plat- form for jet engines.	JT-3; JT-4; CJ-805 engines.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Signal generator, crystal monitored	Boonton Radio Corp., P. O. Box 390, Boonton, N.J.	211-A	10½" x 19½" x 9½". Mounting: std. 19" rack mounting. Weight: 63 lbs. net.	RF range: 88-140 mc. External MOD required for VOR & localizer (BRC 232-A). Internal MOD for Communications & tone.	Use: measuring characteristics of VOR localizer & UHF communications receivers.
Signal generator, glide slope	"	232-A	10½" x 20½" x 12". Mounting: std. 19" rack mounting. Weight: 64 lbs. net.	RF range: 329.3-335.0 mc. 20 crystal controlled RF output frequencies. 1 crystal controlled IF frequency. 100% modulation.	Use: calibration & testing glide slope receivers used in aircraft instrument landing systems.
Signal generator	"	225-A	13" x 19½" x 15". Mounting: std. 19" rack mounting. Weight: 57 lb. net.	RF range: 10-500 mc. Maximum RF stability. Continuous adjustment of RF output level.	Use: general purpose laboratory use with AM (internal) & FM & pulse modulation.
Signal generator calibrators	"	245-C, 245-D	6½" x 9¾" x 6". Mounting: portable or bench use. Weight: 5 lbs. net.	RF range: 500 kc-1000 mc., 245-C output: 5, 10, 20 uv. 245-D output: 0.5, 1, 2 uv.	Use: checking & calibration of RF output & AM modulation of signal generators & precision testing of receiver sensitivity.
Signal generator, sweep	"	240-A	18" x 14½" x 19½". Mounting: std. 19" rack mounting. Weight: 76 lbs. net.	RF range: 4.5-120 mc. Precision CW signal generator & sweep frequency generator.	Use: development & testing of radio frequency pass-band amplifiers.
Slings, build-up with variable CG	Aircraft Equipment Co., 4050 N. W. 28th St., Miami 42, Fla.	R-3350	Weight: 50 lbs.		
Sound suppressor	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	II-1000B	248" x 90". Weight: 10,970 lbs.	Mobile sound suppression, effecting 20 db attenuation at 250 ft.	Customers include aircraft mfrs. & operators in U.S. and in free countries abroad.
"	General Acoustics Corp., 12240 Santa Monica Blvd., Los Angeles, Calif.	AI-59	6' x 9' x 10'. Weight: 2000 lbs.	All current jet engines. Intake.	Portable or fixed.
"	"	AE-15	Width: 8'; length: 28'; height: 9'; weight: 8400 lbs.	Jet engine exhaust. Through JT-4.	Portable or fixed.
"	Industrial Acoustics Co., Inc., 341 Jackson Ave., New York 54, N.Y.	1068	Various.	Jet engine inlet.	All engines & aircraft.
"	"	UDAC	14' x 7' x 14'.	Jet engine run-up.	JT3C-4, -7, JT4A-9-10, CJ1805-3, 3B Aircraft; 880, 880M, 990, 707 & DC-8.
"	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	II-1020	Length: 350"; width: 118"; height: 148" min., 206" max.	Noise reduction in areas such as test facilities & run-up sites.	Used with JT-3, JT-4, CJ-805, Conway & Tyne.
Spark plug cleaning machine	Vapor Blast Manufacturing Co., 3025 W. Atkinson Ave., Milwaukee 9, Wis.	C430	3' x 3' x 4'. Weight: 400 lbs.	Requires compressed air at 10psi & 11v. 160N elect.	
Stand, engine	Whiting Corp., 157th & Lathrop Ave., Harvey, Ill.		Height: 8¾"; width: 5'; weight: 2100 lbs.	All piston engines.	Used by Air France, Capital, TWA.
Step stands, maintenance	Bil-Jax Inc., Wyse Rd., Archbold, Ohio	CG5079-5, CG5079-6, CG5079-8	3' x 5' x 5'; 3' x 6' x 6'; 4' x 8' x 8'.	Furnished with or without guard posts & rails.	Maintenance & overhaul step stands for all & varied uses.
Steam cleaner	Turco Products, Inc., 24600 S. Main St., Wilmington, Calif.	270	57" high, 60" wide, 27" deep. Weight: 950 lbs.	Natural gas or LPG fired. Operates at 140-160 psi/180 gph, 140-160 psi/270 gph, 140-160 psi/270 gph, 80-100 psi/180 gph.	High pressure/high volume & low pressure/medium volume pressure combined in one machine.
Test set, navigation aid	Boonton Radio Corp., P. O. Box 390, Boonton, N.J.	235-A	12 7/32" x 19" x 16 27/32". Mounting: 19" rack mounting. Weight: 80 lbs. net.	RF range: 962-1024 mc. Tacan channels 1-43, 1151-1213 mc. Tacan 64-126, 1011-1049 mc. To be used with Collins Radio Type 578D-1 & 578X-1 test sets.	Use: testing & calibration of DMET & ATC aircraft systems.
Test set, transistor	"	275-A	10 7/8" x 19 5/16" x 12 13/16". Mounting: std. 19" rack mounting. Weight: 46 lbs. net.	RF range: 1 kc. Alpha: (a) 0.100-0.999 (b) 0.900-0.999. Beta 7-200. Direct read-out. Regulated power supplies.	Use: measurement of basic transistor parameters.
Test stand, bearing & seal	REF Dynamics Corp., 393 Jericho Tpk., Mineola, N.Y.	JBOF-1	High: 72"; deep: 60"; wide: 104". Weight: 2850 lbs.	5 gpm flow, MIL-L-7808 fluid, 250°F temperature, 150 psi pressure, 2 hp motor, 220/440 v.	Test oil flows to various bearings & main shaft seals of P & W JT3 & JT4 engines. Sold to Iberia Airlines.
Test stand, compressor bleed	"	PCB-1	High: 72"; deep: 54"; wide: 60". Weight: 2450 lbs.	115 CFM at 2 psia air, 7½ hp electric motor, 220/440 v.	Calibrates pressure ratio control unit on P&W JT3-D engine. Sold to Iberia Airlines.
Test stand, engine airflow	"	PAF-1	High: 28"; deep: 14¾"; wide: 22". Weight: 100 lbs.	0.8 to 85 pph. Air 1% accuracy. 0-30 psig, 40-140°F.	Measures air leakage from jet engine bearing compartments.
Test stand, fuel pump	"	FPP-1	High: 77"; wide: 124"; deep: 42". Weight: 3400 lbs. crated.	110-20,000 pph. Min. P 3 psi at max. flow. 28 v. DC & 400 cycle AC circuits	Tests fuel boost pumps on DC-4, DC-6, DC-7, Caravelle, DC-8, Boeing 707 & Electra. Used by SAS.
Test stand, fuel flow	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	I3648-2-D	54 x 50 x 30 inches. Weight: 1000 lbs.	Range: 100-12,000 lbs. per hr. aviation gasoline or jet fuel.	Designed to test fuel flow transmitters.



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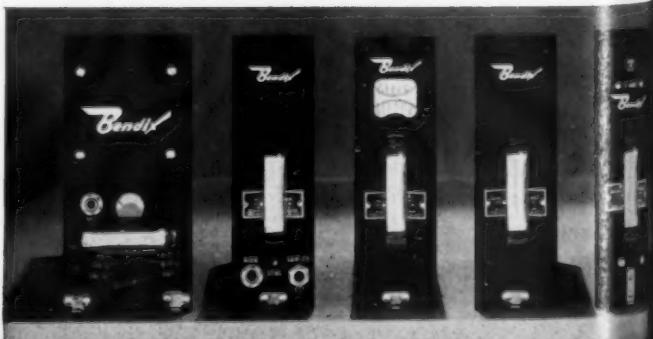
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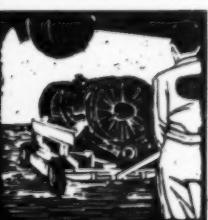
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AIRLINES

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Test stand, fuel pressure	REF Dynamics Corp. 393 Jericho Tpk., Mineola, N. Y.	FMT-I	High: 42"; deep: 48"; wide: 32". Weight: 1125 lbs. crated.	3 hp. 4.3 gpm, MIL-F- 7024A fluid, 0-600 psig, 80° + 10°F, explosion proof.	Checks jet engine fuel sys- tems & installed compo- nents. Pratt & Whitney en- gines.
Test stand, hydraulic	"	JHCT-I	High: 73"; deep: 48"; wide: 120". Weight: 4850 lbs. crated.	60 hp, 220/440 v. 150°F temp. 0-5000 psig, 0-24 gpm Skydrol fluid.	Tests jet aircraft hydraulic system, rotating & non- rotating components. Northwest Airlines, SAS & overhaul shops.
Test stand, mobile engine	Lockheed Industrial Products 1550 Northside Dr., N. W., Atlanta 18, Ga.		Length: 33'1"; width: 8'; Weight: 25,030 lbs.	Complete checkout of C-130-A & C-130-B Q.E.C.	Air transportable self con- tained test unit capable of independent operation.
Test stand, oxygen regulator	Pioneer-Central Div., The Bendix Corp., Davenport, Iowa	3ITA1479D	40" x 24" x 44". Weight: 270 lbs.	Altitude: 0-100,000 ft. Pressure: 0-2000 psig. Flow: 0-200 lpm.	Designed to test oxygen regulators (breathing).
Tester, transponder	Wilcox Electric Co., Inc. 1400 Chestnut St., Kansas City 27, Mo.	758	4 11/16" x 5 5/16" x 1 9/16". Weight: 1 lb.		In-flight test unit.
"	"	860	6" x 2 3/4" x 5 1/4". Weight: 3/2 lbs.		Ramp test unit-transistor- ized.
Thrust indicator, acoustic	Industrial Acoustics Co., Inc. 341 Jackson Ave., New York 54, N. Y.	T-10 through T-35	3.5" x 7.5". Weight: 3 lbs.	110 volt, 400 cycle.	Checks jet engine thrust on run-up by acoustic method.
Thrust measurement systems	General Electric Co., Instrument Dep't, 40 Federal St., West Lynn, Mass.		Vary with engine/aircraft combination & presenta- tion required.	Measures gross thrust of any jet engine within 3% of full scale.	Intended application on turbine powered transports.
Trailer, engine	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	4160B	Length: 174"; width: 78"; height: min. 37", max. 113"; Weight: 3500 lbs. Capacity: 8000 lbs.	Removal & installation of all jet engines in minimum time.	Used on DC-8, 707, 880 & 990. Used with JT-3, JT-4, CJ-805, Conway & Tyne.
Trailer, universal maintenance	"	5060	152" x 82" x 96". Weight: 1700 lbs. Capacity: 8000 lbs.	Support jet engines in an axial rotating configuration for minor repair & build up.	Used with JT-3, JT-4, CJ-805, Conway & Tyne.
Ultrasonic tanks	Turco Products, Inc. 24600 S. Main St., Wilmington, Calif.	Several sizes.	Constructed of 304 S.S. Available in almost any capacity ranging from 1 1/2 gal. to 600 gal.	Ultrasonic generator op- erates at 20,000 cycles per second. Standard sizes from 500 watt to 10 kw. Custom equipment from 5 kw to 24 kw.	Combines high frequency sound waves with special cleaning solutions.
Viscous damper filling equipment	Accessory Controls & Equipment Corp., 805 Bloomfield Ave., Windsor, Conn.	ACE-346	36" x 24" x 60". Weight: 1500 lbs.	Bleed and fill 3 dampers at one time. Heated vacuum chamber, 110 volt operation.	Alitalia DC-8 dampers 5652117, 5652380, 5765015, 5765016, 5765017.
Workstand	Lockheed Industrial Products 1500 Northside Dr., N. W., Atlanta 18, Ga.		14" x 10'4". Weight: 1350 lbs.	Provides access to power plant and propeller for all maintenance operations. Can be completely en- closed.	For use in maintenance and overhaul of C-130A and C-130 aircraft.
"	"		Extended height: 41 ft. Lowered height: 25 ft. Width: 8 ft. Length: 18 ft. Weight: 4500 lbs.	Lifts 500 lbs. (2 people & tools) to height of 41 ft. Air or electric operated. Air and electrical service in basket.	For use in maintenance of high tailed aircraft, build- ing maintenance, etc.
Workstand, baggage	Bil-Jax Inc., Wyse Rd., Archbold, Ohio	NL 5400	54" x 9" with work plat- form levels at 37", 61", 88", 109" and 116".	One man mechanically operated stand.	For use in loading bag- gage and freight supplies, engine and overhaul work and ground service.
Workstand, engine	Air Logistics Corp., 3600 E. Foothill Blvd., Pasadena, Calif.	3160	152" x 54" x 30" (min.), 33" (max.) Weight: 280 lbs. Capacity 8000 lbs.	Tear down, build up, in- spection of jet engines.	Used with JT-3, JT-4, CJ-805, Conway & Tyne.
Workstand, engine	"	3160C	152" x 66" x 31" (min.), 35" (max.). Weight: 700 lbs. Capacity: 8000 lbs.	Tear down, build up, in- spection of jet engines. Castered model.	"
Work stand, hydraulic	Bil-Jax Inc., Wyse Rd., Archbold, Ohio	MSS21	37" x 126" work platform.	Raise to 100", lower to 30". Hydraulic hand pump operated from platform.	Universal mobile stand for maintenance service & overhaul.
Work stand, nacelle	"	NS 1500	54" x 7" with work plat- form levels at 56" adjust- able any height up to 114".	One man operated with hydraulic hand pump.	For Lockheed Electra and other service and overhaul uses.
X-ray unit, portable	Balteau Electric Corp. 10-14 Meadow St., Stamford, Conn.	Baltospot-150	X-ray head: 10" dia. x 25" long; 55 lbs. Control unit: 12 1/2" x 10 1/2" x 6 1/2"; 24 lbs.	140 KV, 3 MA	
"	"	Baltospot-200	X-ray head: 10" x 13 1/2" x 23 1/2"; 85 lbs. Control unit: 12" x 10" x 6 1/2"; 27 1/2 lbs.	200 KV, 3 MA	
"	"	Baltospot-140	X-ray head: 8" x 12" x 13"; 48 lbs. Control unit: 12" x 10" x 6 1/2"; 26 lbs.	140 KV, 3 MA	
"	"	Baltograph-300	X-ray head: 40 1/4" x 12 1/4" dia.; 136 lbs. Control panel: 15" x 12" x 7"; 41 lbs.	300 KV, 3 MA	



Let's End Terminal Confusion

Outmoded communications methods, lacking any systems approach, make airport terminals a puzzle to passengers.

By LEIGH FISHER

In the field of airport equipment and operations, one of the most vital areas yet to be researched is that of communications—airport and airline communication with the passenger.

As a matter of daily occurrence, foreigners, children, aged, infirm, and hard of hearing persons are flying as fare-paying passengers, along with a growing number of not-too-bright citizens.

While terminal populations have jumped some 400% since 1945, and while internal airline communications have been improved as traffic has swamped older airline methods, no basic changes in airport communications for the passenger have been made.

IBM has developed its "SABRE" system of data processing for American Airlines' reservations. United now has the "Instamatic" electronic reservations system, AT&T's TELPAK promises improved internal communications with great savings to the airlines, and Remington Rand UNIVAC's new AID system may ease the burden of interline reservations.

All progress is inbred

When it comes to selling the ticket and booking the reservations, millions in research and development have been expended and the results have been worthwhile. But this effort has been

Meet Leigh Fisher

Commencing in this issue of AIRLIFT, airport authority Leigh Fisher joins the staff as editorial director-airports. Look for his provocative commentaries on this important aspect of air transportation in all future issues.

aimed at internal communications—within an airline system or among the airlines themselves.

The passenger at the airport is still exposed to the 1945-48 system of gate designations, signs, public announcements, arrival-departure information and flight information. He finds confusion in announcement methods, procedures and terminology, as well as misleading and misplaced signs, arrows and directional designations. Often the new electronic departure boards, TV information systems and other individual ideas and experiments merely add to his dilemma.

In a typical terminal building today these hallmarks of confusion are evident on every hand. Even worse, to the growing number of "average" passengers, is the lack of uniformity. At each new airport a new pattern must be suffered.

Have you watched the passenger sitting in the lobby jump up as he hears his name in a paging announcement? All it said was, "Would Passenger Roberts on Intercean Airlines please

report to . . ." the information desk . . . the stand-by desk . . . position 3 . . . the ticket counter . . . or some other precise location familiar to the counter agent making the announcement, but as indefinite to Passenger Roberts as though he were directed to Pago Pago.

Have you then continued to watch Passenger Roberts as he compounds the general confusion, passenger problems, and terminal clogging by pushing through ticketing lines, tripping over bags, and asking many questions of the wrong people before he ultimately is correctly routed to the passenger agent who paged him?

A compass, please!

Even a simple announcement as "Flight 742 departing from Gate 3A in the North Concourse" may often cause specific confusion. Observe the poor passenger who has no sense of direction trying to figure out "north" from "right" or "left." Most frequently he is simply lost, and has to search out the route with some delay and considerable inconvenience.

The problem is much greater than just airline flight departure, arrival and paging communications. And it cannot be solved by installing more signs, since it has been proved time and again in public buildings that people simply can't read signs easily—

Continued on page 80



RARE SIGHT at airports is a central flight board. One gaining acceptance is Solari system (above) used by Pan Am at Idlewild.



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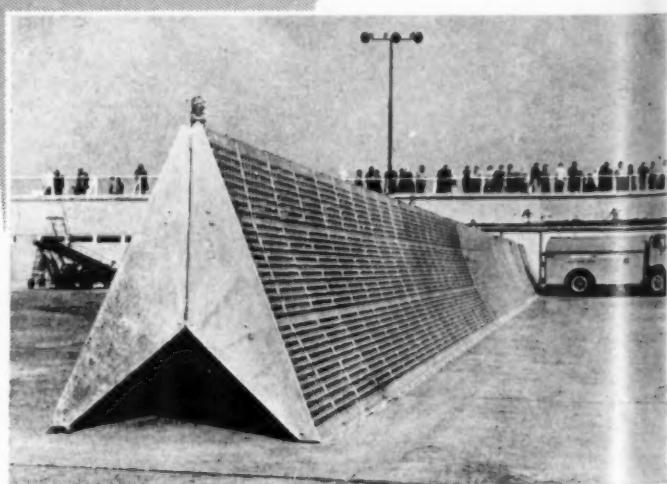
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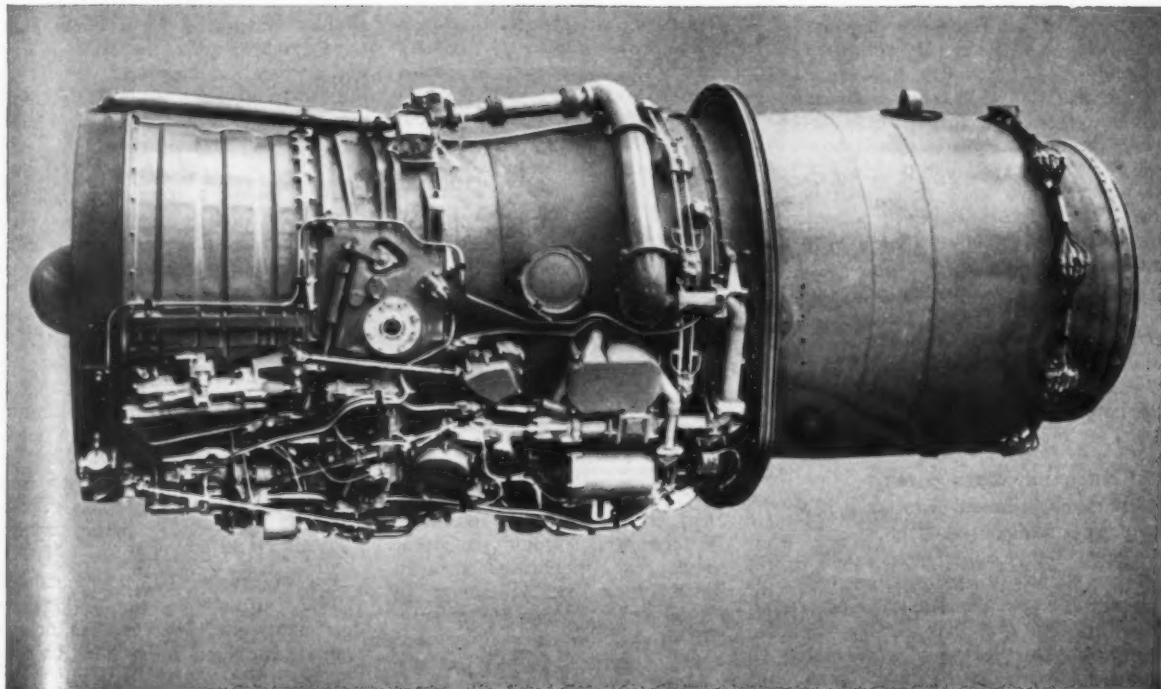
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79



MADE TO ORDER
confusion. Page telephone at Washington (far left) is yellow, at London (right) it's green and at San Francisco it's white.

Continued from page 76

the more signs, the slower the flow of people.

As terminal buildings have sprouted out with tentacle-like fingers, and gate positions have increased from 6 to 60 at a single terminal, walking distances sometimes have shot up to a mile between extremities. Some terminals now handle more than 50,000 people and 5000 cars at their peak periods. It is no wonder that the outmoded airport communication procedures no longer function properly.

The airlines have consistently proved unable to agree upon a common arrival-departure information system in the various airport terminals. Paging procedures vary even more from airline to airline, and from counter agent to counter agent.

Total communications a must

Airport management historically has tended to ignore the problem.

Airport and airline managements both have yet to realize the communications impact of departure lounges, trickle loading, and the growing decentralization of passengers within the terminals. In spread out terminal complexes, a total communications system is needed, one which, for example, will permit the overweight heart patient arriving 20 minutes late on a local service flight at Gate 35 on Pier D to pick up an information phone and determine immediately whether or not he can make his non-stop transcontinental flight at Gate 4 on Pier A, a 20-minute walk down the fingers.

The communications system should cure the problem of the lady passenger who fell on the finger stairs, broke her hip and lay there 25 minutes before someone ran into the lobby, told a counter agent, who in turn called air-

port management, who dispatched one of the airport security staff to handle the problem.

The separate communications requirements of the different areas of a terminal complex can also be recognized in a full system. In the bag claim area, for example, announcements can and should vary radically from the departure announcements required in the fingers, concourses, and departure areas. A full communications system can provide information at key points in the parking lot, at the airport hotel and at many "convenience points" throughout the terminal area.

Flexibility is important

It's about time that visual and sonic airport communications should be viewed as a single entity, transmitting individual and cumulative airline and airport administrative intelligence to the passenger and general public in a precise, clear, convenient and usable manner. Furthermore, it would seem that this intelligence should be handled through a system flexible enough to provide the passenger and general public with information where they need it and when they need it—not just at a few central points. Communications must be brought to the passengers, wherever they are.

If growing traffic volumes are to be accommodated in existing terminals and new terminals are to be developed on an economical space basis, passenger information must be brought to them and to the public in the concourses, piers, concessions, halls, lobbies and waiting areas so that passengers can keep moving. Only in this way can counters be kept free, concourses open, and passengers flowing through the terminals, as volumes continue to grow.

Research should develop a stand-

ardized "airport communications package," which could include arrival-departure information systems, public address systems, internal communications systems, music systems, courtesy and information telephone systems, and the many other yet-to-be-developed communications media which will simplify the passengers' airport dilemma.

There's much to consider

Airport and airline management must consider their many communications requirements covering the gamut from pneumatic tube systems, multilingual paging systems, courtesy-information-reconfirmation phone systems, valet parking call-up phones, directional and identification signing as related to communications, color coding of fingers and signs, with multilingual signs and information service, public emergency and security communications, and the other requirements of our growing airport terminal complexes.

For whether we like it or not, these various airport communications requirements are being handled now as separate problems rather than as components of a single, over-all system and, consequently, in an increasingly complex, confused and sometimes contradictory fashion. Capital, operation and maintenance costs are being incurred in each of these systems which are now being installed on independent and frequently conflicting bases. Inevitably, duplication of function, capital expenditure and subsequent operating costs is the penalty, along with increased passenger confusion.

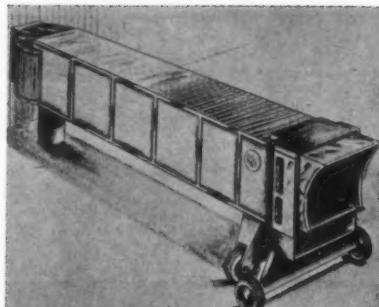
The time has now been reached when research and development funds can soundly be expended on the development of a total "airport communications package!" ■



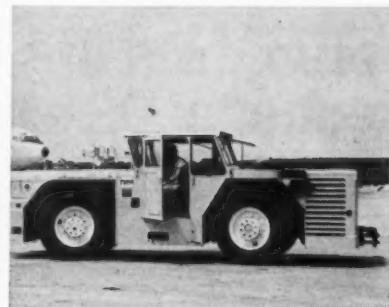
FOOD LOADER
(Cochran Equipment Co.)



SNOWPLOW (Wausau Iron Works)



SKYPASS passenger bridge (AMF)



TOW TRACTOR (Frank G. Hough Co.)

Airport

Equipment

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Calendar Clock	Solari & C., Via Chiusaforte No. 1, Udine, Italy	Electric		Fully automatic.	Installed at Paris, Vienna, Munich, Brussels, Rome, etc.
Condenser discharge flasher system	Westinghouse Electric Corp., Lighting Div., Cleveland, Ohio	CD-3 System		FAA & military specs.	For runway instrument approach system.
Dolly, aircraft spotting	Consolidated Diesel Electric Corp., 880 Canal St., Stamford, Conn.	2094	11'3" x 6'3" x 2'4". Weight: 5000 lbs.	Provides 6000 lbs. drawbar pull. Supplies 30 v. DC.	One-man, one-hand opera- tion. 28 inch height per- mits use under craft.
Flight information system	Solari & C., Via Chiusaforte No. 1, Udine, Italy	Electric		Fully automatic "RollUP- matic" system.	12 volts. Rome, Milan, Marseilles, Vienna, Lubljana, Yugoslavia.
Flood lights, dual platform	Aircraft Equipment Co., 4050 N. W. 28th St., Miami 42, Fla.	GP-4020-2 and six other models	Weights: 43 to 6500 lbs.		Single, split and multi- platform types pedestal. Mounted lights.
Ground support unit	Consolidated Diesel Electric Corp., 880 Canal St., Stamford, Conn.	2035	11'2" x 5'3½" x 5'. Weight: 6000 lbs.	Supplies 400-cycle AC, 28 v. DC, 4500 lb. drawbar pull, four-wheel drive.	One-man operation. Optional winterization permits operation to -45°. Self-propelled.
"	"	2015	13'10" x 7'10" x 6'1". Weight: 7700 lbs.	Supplies 400-cycle AC, 28 v. DC, 3500 psi air, 117 psi air and 4500 lb. draw- bar pull. Four-wheel drive.	Standard unit operable to -20°F. Optional winter- ization modification permits operation at -45°.
Heaters, revolving unit	L. J. Wing Mfg. Co., Div.- Aero Flow Dynamics, Inc. Linden, N. J.		Eight sizes.	Capacities: 400,000 to 1,250,000 BTU/hr.	For hangar heating.
Lighting control panels	Westinghouse Electric Corp., Lighting Div., Cleveland, Ohio	Civil L-821		FAA spec. L-821.	Runway, taxiway, approach, centerline & narrow gage lighting.
Lighting roadway	"	OV-25, OV-50			Entrance, access & service roadways & parking areas.
Light, 45 watt inset	"	CL-2, CL-I			Runway & high speed taxiway exits on instrument runways.
Lights, medium intensity runway	"	L-819			Edge & threshold of instrument runway.
Lights, medium intensity runway & taxiway	"	L-802, L-822			Non-instrument runways & taxiways.
Lights, construction	"	L-810			Airport boundaries & obstructions.
Lights, semi-flush	"	B1, B2	1" high, 200 watt; 1" high, 500 watt.	FAA & military specs.	Approach, threshold & runway intersection lights.
Piped systems, dry chemical	Ansol Chemical Co., 1 Stanton St., Marinette, Wisc.		Dry chemical capacities from 30 to 500 lbs.	May be actuated manually or automatically.	Suitable for safeguarding flammable liquid, gas & electrical hazards requir- ing fixed protection.

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Radar, airport surface detection	Airborne Instruments Laboratory, Div.-Cutter-Hammer, Inc., Deer Park, N. Y.	ASDE-2	Antenna 4' x 12' in a 17' radome.	Frequency 25 Kmc. Power 36-50 kw. 5 sweep ranges, 0.5 to 4.0 miles. 16" PPI indicator. Rotation: 60 rpm.	Used for control of ground traffic over entire airport surface.
Radio	Communications Co., Inc., 300 Greco Ave., Coral Gables, Fla.	707 JETCOM AM/FM combination		118-152 mc. AM, 250-50, 144-174 mc. FM.	Monitors control tower & company FM frequency simultaneously.
"	"	678 VHF-AM	Trans/Rec. 5 1/2" x 12 1/2" x 9 1/2". Control head 5 1/2" x 3 1/4" x 5".	118-152 mc., 6 v DC, 12 v DC, 24 v DC, 6/12/117 v AC.	Transistor power supply. Suitable for UNICOM use.
"	General Electric Co., Communication Products, Lynchburg, Va.	TPL Voice Commander	9" x 15" x 4"; weight: 18 lbs. 9 1/2" x 5 3/4" x 1.7"; weight: 52 oz.	VHF-FM, 25-54 mc., 130-174 mc., 132-174 mc. UHF-FM.	For airport ground use. "
"	"	278 VHF-AM	Trans/Rec. 5 1/2" x 11" x 13". Control head 3 3/4" x 2 1/2" x 4 1/2".	118-152 mc., 6/12/24v. DC, 117v. AC.	Complete mobile installation package.
Receiver, airport tower	"	278 4 ARE		118-150 mc.	Single or dual channel. Rack or desk mount.
Reservations system	The Teletelregister Corp., 445 Fairfield Ave., Stamford, Conn.	Special purpose computer.		Uses remote agent sets for input/output.	TWA, Northeast, American, National, Western.
"	"	Electro-mechanical		Uses remote agent sets for input/output.	American, Pan American, Braniff.
Reservations system, inventory	"	Special purpose computer		Uses teletype input/output.	
Runway end identifier	Westinghouse Electric Corp., Lighting Div., Cleveland, Ohio	CD-3E	I pair of CD-3 elevated units & timer for flashing.	FAA & military specs.	For signalling approach end of active runway.
Runway sweeper, magnetic	Consolidated Diesel Electric Corp., 880 Canal St., Stamford, Conn.	2100	10'8" x 8' x 6'9 1/2". Weight: 6800 lbs.	Sweeps 8-ft. path clear of ferrous debris at a governed speed of 5 mph. Hydraulic assembly raises & lowers magnet.	Can be equipped with enclosed driver cab.
Runway vacuum sweeper	"	2095	30'6" x 11' x 8". Weight: 17,300 lbs.	Cleans 8 ft. swath, 1,000,000 sq. ft. per hour. Maximum cleaning speed: 25 mph. Maximum highway speed: 35 mph.	Employs 155 hp. gasoline engine for propulsion; 25 hp. engine for fan.
Snow blower & snow loader	Sicard Ind., Inc., Watertown, N. Y.	BK	Width: 103". Weight: 6900 lbs.	Capacity: 18 tons per minute.	Mounting on front end loaders.
"	"	BB	Width: 6'6". Weight: 2000 lbs.	Capacity: 4 tons per minute.	Mounting on wheel tractors.
"	"	BI	Width: 100". Weight: 9000 lbs. less chassis.	Capacity: 20 tons per min.	For mounting on 4-wheel-driven trucks.
"	"	Junior	Width of cut: 7'. Weight: 13,000 lbs.	Capacity: 18 tons per minute.	Integral chassis & blower combination.
"	"	BM	Width: 102". Weight: 4000 lbs.	Capacity: 8 tons per minute.	Mounting on front end loader.
"	"	BL	Width: 102". Weight: 13,500 lbs. less chassis.	Capacity: 25 tons per minute.	Mounting on 4-wheel-driven trucks.
Snow plow, airport	FWD Corp., Clintonville, Wis.	FWD Airporter	Moldboard: 12 ft. long, 66 in. high. Overall height to top of deflector: 75". Plowing angle: 40° R. & L. Weight with mtg.: 3275 lbs.	Full power, hyd. reversing, high speed plow. Cuts 110" width at full 40° angle.	Designed for high speed runway snow removal.
Snow plow unit, rotary	"	CF4-9420	GWY 34,000 lbs.; 325" length with plow; 102" width with plow; 127" height with plow.	45MPH top speed. 4-wheel steer. 330 HP drive eng. 330 HP plow engine. 1500 ton per hour capacity. 125 ft. cast. dist.	
Snow plows, snow wings, rotary snow plows	Wausau Iron Works, Wausau, Wis.	Sno-Thro rotary snow plows, models 72-58, 84-56	A self-propelled unit for operation on all major bucket loaders of 1 yard capacity & over.		Also snow rings and rotary plows.
Snow removal equipment	American Snowblast Corp., 1237 Shoshone St., Denver 4, Colo.	R-2200-A	Size: 32'10" x 106" x 104". Weight: 20 tons.	Capacity: up to 2200 tons/hr.	High speed, high capacity snow removal. New York Int'l Airport.
"	"	R-1000	Overall: 28'4" x 106" x 98". Weight: 23,000 lbs.	Capacity: up to 1000 tons/hr.	"
"	"	R-40	Overall length: 120". Weight: 1600 lbs.	Snow removal capacity: 150 tons/hr.	Snow removal around landing lights, ramp areas, passenger terminals, walkways, parking lots & truck loading. New York Int'l Airport.
"	"	R-140	Overall length: 120". Weight: 2500 lbs.	Snow removal capacity: 150 tons/hr.	"
Sweeper, airport	Sicard Ind., Inc., Watertown, N. Y.	SW-112	Sweeping width: 12 ft. Overall length: 39 ft. Weight: 11,000 lbs.	Capable of sweeping snow, slush, water, sand & debris at speeds up to 25 mph. Sweeping capacity: over 1,000,000 sq. ft. per hr.	Towed type, powered steel tuft broom, followed by air blast with a velocity up to 200 mph.

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PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
Tractor, aircraft towing	Consolidated Diesel Electric Corporation, 880 Canal St., Stamford, Conn.	2131	Overall: 16'10" x 8'6" x 8'.	Tow or push aircraft up to 500,000 lbs. Winch provides 60,000 pound pull. Four-wheel drive, four-wheel steering.	Accommodates driver, four passengers. No spin differentials prevent spinning of single wheel.
Trailer, aircraft fuel transfer	"	2130	Dimensions: 13'3 1/2" x 5'6" x 5'2". Weight: 1800 lbs.	For use with hydrant fueling systems. 600 gpm capacity. For single-point fueling. Surge controlled. Removes air, water, foreign matter. Meters.	Handles all types aircraft fuels. Used in both fueling and defueling.
Truck, aircraft refueling, tank	"	2116	Dimensions: 30'9" x 11' x 8'5". Weight: 20,000 lbs. unloaded.	5000 gallon capacity. 600 gpm delivery. Single-point or over-wing service. Fuels or defuels. Surge controlled.	Handles all types aircraft fuels. Will service any type aircraft.
Truck, demineralized water, tank	"	2124	Dimensions: 30'9" x 9'10" x 8'. Weight: 20,000 lbs. unloaded.	2600 gallon capacity. Delivers 300 gpm. Removes 300 gpm. Filters during supply and removal. Adaptable to fuel handling.	Can be equipped with automatic heater to maintain water at desired temperature in cold climates.
Truck, fire & rescue	FWD Corporation Clintonville, Wis.	A/S32P-2	GVW 62,500 lbs.; 8 x 8, 374" length; 140" height; 104" width. 125 gpm.	600 hp twin engines. 0-55 mph in 38 sec. 60% gradeability. 2300 gal. water, 200 gal. foam. 1400 gpm water foam.	
Truck, crash fire & rescue	"	MB-1A	GVW 35,000 lbs.; 6 x 6, 346" length; 129" height; 96" width.	340 hp engine, 60 mph top speed. 0-55 mph in 42 seconds. 60% gradeability. 1000 gal. water, 400 lb. dry chem, 45 gal. foam. 6000 gpm foam discharge rate. 60 gpm handling rate.	
Truck, crash fire & rescue	"	MB-4	GVW 40,000 lbs.; 8 x 8, 349" length; 130" height; 104" width (reducible to 96").	70 mph top speed. 0-65 mph in 60 seconds. 60% gradeability. 1000 gal. water, 100 gal. foam, 750 gpm foam or water discharge rate.	

Air Traffic Control Equipment

PRODUCT	MANUFACTURER/ ADDRESS	MODEL NO.	DIMENSIONS/ WEIGHT	OPERATING DATA	REMARKS
ATC central, NA/GSN-II	Avco Corp., Electronics & Ordnance Div., Cincinnati 41, Ohio	AN/GSN-II	Ground-based equipment requiring 3000 sq. ft. space.		Now under test by FAA. Development of Volscan.
Antenna, VHF	Communications Co., Inc., 300 Greco Ave., Coral Gables, Fla.	399-P		118-150Mc.	"J" type for airport control towers.
Beacons, 300 MM code	Westinghouse Electric Corporation, Lighting Division, Cleveland, Ohio	CAA-446		CAA Spec. 446	For marking small airport locations & hazards to air navigation.
Beacons, rotating	"	CAA-291		CAA spec. 291	For airport & airway location signals.
Multiple data processing system	General Precision-Librascope Division, 808 Western Ave., Glendale 1, Calif.	L-3020	Modular construction. Approx. 15 tons.	Core-memory: 8-16,000 word storage, 6 micro-second cycle time, 0.5 megacycle internal clock rate. Four drum files: 128,000 words (7,168,000 bits) storage capacity.	A real-time data processing system for Air Route Traffic Control Centers.
Quadradar	Gilliland Bros., Inc., 1815 Venice Blvd., Los Angeles 6, Calif.	AN/FPN-33, AN/FPN-34, AN/FPN-40	Transportable in 2-wheel trailer, 3 leg mounting with leveling jacks. Gross: 4352 lbs.	Search final approach, height-finding & airport surveillance. Range to 40 miles. Altitude to 50,000 ft.	Boeing, Northwest Airlines, Argentina, Finland, France, Ireland, Italy and Austria.
Radar, GCA	"	AN/CPN-4, AN/MPN-11	Semi-trailer mounted GCA radar. Diesel-electric power system.	S-band airport surveillance system. X-band precision azimuth and elevation radar.	In use throughout the free world.
Radar, GCA	"	AN/FPN-16	Non-mobile precision approach radar.	S-band airport surveillance system. X-band precision azimuth and elevation radar.	In use throughout the free world.
VHF station	Wilcox Electric Co., Inc., 1400 Chestnut St., Kansas City 27, Mo.	428	24" x 17" x 72".	Single channel.	50 watts
VOR station VOR station	"	462A 438A		50 watts. 200 watts.	Single or dual. Dual only.

AIRLIFTS

• From Remmer-Werner (fixed-base operator at Lambert Field, St. Louis, and elsewhere) comes the latest issue of the "News-Press-Times-Dispatch-Chronicle-Herald" (this is a new name—the publication formerly was called "News-Press-Times-Dispatch-Herald-Chronicle") full of tid bits about executive pilots and aircraft.

Among a wealth of newsy items is this bit of sage financial advice attributed to Bill Lawrence and Bob Canterera of Air Reduction. Guaranteed foolproof way to go out to Las Vegas and return with a small fortune: go out with a large fortune.

• A travel agent in Houston, Texas, owes a debt of gratitude to a Swissair pennant. This is a triangular piece of red cloth with the word SWISSAIR in a white circle. The agent had affixed it to her red convertible. Parked in downtown Houston, her meter ran out. Up walked a policeman, and reached for his ticket pad. Then he spied the pennant, scratched his head, put away the ticket pad and walked away. An onlooker explained he had mistaken the pennant to mean diplomatic immunity.

• Through-ticketed air taxi service to offline points is a fine idea, one generally endorsed by airline management and air taxi operators alike. But its availability could perhaps be better publicized, especially among airline reservations personnel. A recent attempt by an *AIRLIFT* editor to utilize air taxi was finally successful after eight callbacks from the airline involved:

1. Agent had never heard of such a service, but would check.

2. Yes, there was such a service, and it would be ticketed.

3. (next day) Another agent wanted to know just what the request was for.

4. Several air taxis were available, which was preferred?

5. Several types of airplanes were available, which was wanted?

6. Would a one-hour wait for a regular taxi flight be acceptable or would the editor prefer charter, and how many passengers were involved?

7. Was the trip to be one-way or roundtrip?

8. Trip was scheduled.

• The City of Los Angeles picked up \$719 income during the last fiscal year from 10 agricultural leases at its L.A. International and Van Nuys Airports. Crops have ranged from dry-farmed grain to commercial flowers. Crop pay off by providing good ground cover, reducing dust, and lessening maintenance and weed problems.

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Continued from page 26

a unit as related to its projected meantime to failure.

Whatever attaching method is used, it must (1) produce proper mating of the accessory with the engine pod upon initial installation without the use of special aligning tools and fixtures which are not always available at every line station; (2) continue to maintain such mating throughout its service life and (3) provide a visual means, such as inspection slots or holes, to facilitate checking the installation to assure that proper mating has taken place.

Acceptance will follow reliability.

Pneumatics Need Help

By B. L. TERRELL

Chief Systems Engineer, Delta Air Lines

One of the more significant sources of jet equipment flight delays and cancellations has been the low pressure pneumatic system. These delays and cancellations, although arising from a wide variety of sources, point out the fact that much improvement is needed before system operation will approach the reliability level demanded by commercial operators. As an example, for the past eighteen months Delta has experienced 5.1 delays per 1000 hours (DC-8) and 3.2 delays per 1000 hours (CV-880) attributed to pneumatic system or component malfunction.

It should be noted that the use of pneumatic power is not quite as satisfactory as first envisioned in some quarters. The lack of power available at low throttle settings quickly becomes apparent. This manifests itself in such ways as poor performance of pneumatically-powered refrigeration units during ground operation, insufficient anti and de-icing capacity during idle descent, and severe limitations on dispatch with less than full system supply available.

Small part failures

Numerous problems related to hardware deficiencies have also been encountered. These have arisen from unrealistic design specifications, design errors and poor quality control. In this general area, too many malfunctions are due to the failure of a small, relatively insignificant component or part.

One factor contributing to operational difficulties is the trend toward overly sophisticated units and systems. This probably stems from the desire to have a self-sufficient, completely automatic system, but is definitely detrimental to reliable operation. Uncounted hours of maintenance time have been expended in identifying and isolating malfunctions.

One of the major drawbacks to the use of pneumatic power is its capacity to cause extensive damage if not properly contained. Several incidents have occurred where a major leak caused subsequent heat damage to adjacent structure and electrical wiring. Most major failures of this nature have been in the pod/pylon area, and resulted in an engine shutdown and off-schedule landing.

Test requirements, although not directly affecting scheduled operations, have been a source of considerable grief to the average operator. Many test requirements apparently reflected qualification requirements, and were written without regard to the possible effect on the operator. A strong effort is currently being made by a majority of the affected parties to relieve this situation.

With the exception of the lack of power mentioned earlier, it appears that future efforts should be directed toward improving operational reliability by producing simpler and more rugged components.

One recurrent failure encountered to date has been deformation and excessive area of control valve seats and ball or poppet. The result of this is loss of control of an otherwise serviceable unit.



TERRELL

Another item of this nature is resistance to contamination. Although almost all components utilize filters, these are either easily clogged or require excessive maintenance. Obviously the ideal solution would be to develop contaminant tolerant units. This appears to be within the current state of the art.

Rapid loss of sealing effectiveness due to wear and distortion is a problem that requires corrective action. Although some manufacturers are evad-

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ing this issue by increasing the allowable leakage, it is a problem that should be resolved.

The effect of vibration is particularly destructive on components containing coil springs. Emphasis should be placed on either introducing damping elements or eliminating the coil spring as such.

Open field for improvement

One problem that particularly affects valves and regulators is that of binding. This can be due to piston ring friction, galling, improper lubrication, or other causes. The result is erratic operation. Although some corrective action is currently under way, this is an area open to much improvement.

Another area requiring design attention is the choice of more suitable materials. Magnesium, in particular, is susceptible to corrosion and deterioration when subjected to temperature and moisture conditions encountered in system operation. Materials currently used in control and power diaphragms are not sufficiently durable. Tearing, rapid wear and leakage of these items contribute to erratic system operation.

Calibration drift during operation contributes to the difficulty encountered in maintaining scheduled operation. Although much effort has been expended on this problem, the condition still exists. Some means of assuring stable and consistent operation is definitely required.

The low pressure pneumatic system is basically sound in concept, and is certainly capable of attaining the desired degree of reliability. However, this will require the continuing efforts of the various component and airframe manufacturers together with the commercial operators.

Hydraulics and Tires

By R. M. ADAMS

Manager-Maintenance,
Pan Am Overseas Division

While the jet aircraft hydraulic systems are installed with all the latest and sophisticated improvements which the state-of-the-art makes available, the airlines still are plagued with excessive maintenance and delays. The major problem areas are:

"O" ring seal failures—in the first place, there are just too many "O" rings in the hydraulic system. In many applications the best of mechanics often must rely on luck to get the "O" ring installed satisfactorily. Secondly, we need new seal materials which will provide greater tear strength and resistance to abrasion and cutting.



ADAMS

The material must maintain these characteristics unchanged with time and exposure to operating temperatures.

Loosening of fittings and "B" nuts, and chafing of hydraulic plumbing—the environmental vibration and fluid system characteristics have not received sufficient consideration from designers with the result that the hydraulic system fails too frequently.

Needed: better tires

We need better aircraft tires. Jet aircraft presently are equipped with main wheel tires qualified to speeds of 200 to 225 mph. To qualify tires at these speeds, the tread depth is limited to .400" for 200 mph and .330" for 225 mph. The present method of tire

construction along with the limitations of the material and adhesives used in jet tires today prohibits an increase in tread depth due to the centrifugal forces imposed on the tire during take-off.

If this approach is adopted in tire design for tomorrow's aircraft, tires qualified at 250 to 300 mph could conceivably be manufactured with skid depth of .200" or less.

Down .004" per landing

The average landing on an MLG tire reduces the tread depth by .004". 200 mph tires with .400" skid depth average 100 landings. 225 mph tires with .330" skid, under similar operating conditions, will average 82 landings, or a reduction of approximately 20%.

The reduction in tread depth of jet tires from piston engine aircraft tires (average of .500") has increased operating costs through reductions in landings and the increase in the scrap rate from 10% to 30% for retreadable tires. 23% of all tires inspected for retreading are rejected for cuts and holes.

\$1 million tire bill

The annual cost to maintain new and retreaded tires for 50 jet aircraft is approximately \$1,000,000 per year. As jet take-off speeds are increased, it is conceivable that these costs will increase by 100% unless developments in tire design, manufacture and retreading are forthcoming to increase tread depth and reduce the scrap rate due to operational damage.

Continued on next page

A black and white advertisement for Frazier Aviation Services, Inc. The ad features a hand pointing towards a list of services. The text reads:
*We are pleased to announce:
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The Frazier logo, featuring a stylized globe and arrows, is at the bottom left. At the bottom right, the address is given: 7424 Beverly Blvd., Los Angeles 36, Calif. WEsterly 8-7133.

Jets make considerable use of Skydrol-resistant paint on high strength steel surfaces, particularly on landing gear components. We need a better paint stripper which will remove these paints in minutes, instead of the four to six hours it now takes.

Better seating flexibility

Pan American, on global routes, must have aircraft with seating flexibility to satisfy varying demands for first class and economy service. This has a great influence on our "profit and loss" statement. While jets now have a so-called flexible interior, there are major items such as lounges, galleys and lavatories which are either not readily removable or require hours to remove instead of the minutes which are available at many of our transit stations.

Designers still have to learn how to put a satisfactory coffee-making system in aircraft.

The manufacturers of aircraft and aircraft components still gear their post overhaul test requirements to military specifications which, too frequently, are unrealistic for an airline operator. These manufacturers need to get their designers and specification engineers

some "on the job" airline engineering experience.

There is still too much tendency to design aircraft installations on a piece-part basis. What we need are more sub-assemblies which can be removed and quickly replaced with spares permitting discrepancies in the sub-assemblies to be corrected after the airplane has departed.

The aircraft manufacturer's Structural Repair Manuals never have adequate typical repair information covering the areas on the aircraft most susceptible to ground damage.

False Warning Plague

By H. L. TUFTS,

Manager, Performance/Airframe Engineering,
Northeast Airlines

In spite of many years of experience with problems and development, the field of fire detection continues to plague the industry with unwarranted high maintenance costs due to malfunctions. The basic reasons have changed little. Detectors are either too sensitive, too insensitive, too close to the heat source, too remote from the fire source, or otherwise prone to malfunction thru physical damage.



TUFTS

A system designed to alarm at a target temperature or rate of temperature rise cannot universally be adapted to the job of detecting fires, regardless of its ability to perform infallibly as a detector of thermal condition. Properly located and endowed with reasonable acuteness of reflex, a human being will outperform the majority of thermal sensing systems in fire detection. Yet

An advertisement for Gledhill Snow Plows. It features a large white snowplow truck on a runway. In the background, an airplane is parked. The text reads: "ON AIRPORT RUNWAYS OR COUNTRY ROADS...". Below the truck, a box contains the text: "RIGHT-V-LEFT hydraulic control in cab converts right-hand taper to "V" and to left taper while truck is in motion." The overall scene suggests a dual-purpose snowplow for both airports and rural roads.

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This R-V-L Plow, used at the Columbus Airport, is only one of a complete line of Gledhill snow and ice removal equipment. Other types of snow plows include "V" Plows with Wings, Straight Plows and Taper Plows—plus custom designs and sizes.

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AIRLIFT

humans certainly are not consistent in reaction to temperature.

The standards are falling

Regardless of the fact that research has produced several types of systems designed about the ideal concept of fire (not heat) detection, most air carrier aircraft still are equipped with thermal detectors erroneously labeled "fire detectors."

Perhaps profit has overpowered moral reason and induced the industry to distort facts in a campaign to force FAA acceptance of lower standards (witness the recent TSO-CIID amendment).

Or, perhaps the industry has been lost in a forest of step-by-step, cut-and-try de-bugging schemes. Whatever their collective excuses of the past, it is time that ATA, AIA, and FAA recognize the differences between heat and fire detectors and limit our use of each to its own application.

Art vs. Reliability

By PAUL A. FREUHAUF
Manager of Aircraft Engineering,
United Air Lines

We, in the mechanical end of the airline business, are learning a hard lesson on the present generation of



FREUHAUF

turbine aircraft. Let us hope that we and the designers remember our lesson well for the future.

It would appear from an analysis of jet operations that the designers reached for the ultimate in the state of the art rather than for proved reliability and ease of maintenance when planning our present equipment. There is no substitute for straightforward design and there is no getting around exhaustive

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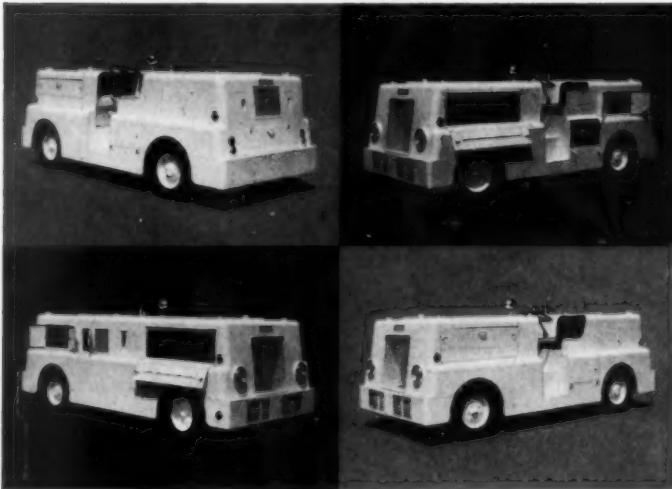
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testing in the production of aircraft for commercial operations. Our watchwords are reliability and economy. We must have them both.

With the experience the designers have accumulated it would seem that reasonably trouble-free systems and components could be developed—that hydraulic fluid could be contained more consistently than has been the case, that static devices such as heat exchangers could last more than a few hundred hours, that fire detection systems could sound fewer false alarms. Actually, we are still putting up with design deficiencies and resultant irregularities that were noted and called to the attention of vendors long before the advent of jets.

Piston standards won't do

Since we must operate the present generation of jets and do it reliably and economically, it is essential that we have the cooperation of the best brains in the industry. Equipment designers and airline engineers must be brought together in a better working relationship. Progress must be made toward improved component design with maximized reliability. Piston-era performance records aren't good enough for operating jet airlines.

Supersonic service will not be possible, economically and otherwise, if trips are to be delayed and cancelled because of difficult-to-locate minor troubles, many of which plague us today.

The first thing we must do, of course, is build into the total aircraft a higher level of dependability. The second is to include a means—either semi or fully automatic—for quickly checking systems and components so that malfunctioning, when encountered, can be pinpointed for immediate correction. A two-bit item cannot be allowed to keep a \$5-million, let alone a \$20-million, aircraft on the ground.

For Reliable Structures

By R. G. WAGENER

Supervisor Aircraft Engineering,
Delta Air Lines

Airframe structural reliability is an absolute necessity from an airline operator's viewpoint. It includes an adequate predetermined service life for individual components and their accessibility for repairs. Other factors to be considered are the simplicity of repair or replacement and the cost.

Structural reliability encompasses both the static airframe and the mechanical linkages required for operation. Close liaison is necessary be-

Continued on page 92



METROPOLITAN MIAMI

A unique editorial undertaking will be incorporated in the January issue of both AIRLIFT and SKYWAYS. An entire insert section will be incorporated in both magazines containing the story of one of the most progressive and vibrant communities in this country and the role of aviation in its community life.

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- THE IMPACT of aviation on Miami/Dade County.
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- AIR TRANSPORTATION—importance of the airlines to the area.
- MANUFACTURERS OF EQUIPMENT—number and growth.
- CORPORATE AND BUSINESS FLYING—how this traffic is handled; future plans for handling it.
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Continued from page 90

tween manufacturer and operator to produce a successful, reliable airframe. The advent of the supersonic transport demands that this effort should commence immediately.



WAGENER

Each new material and process must be thoroughly evaluated under airline operating conditions before approval for use on commercial aircraft. The evaluation should include analysis of

practical operational limits for each material or process as well as development of repair procedures compatible with normal airline operating capabilities. Recent examples of materials approved for use before the completion of the necessary thorough evaluation are honeycomb type structure and high strength steels (above 220,000 psi) in critical applications. The economic effect on operators from such decisions is usually serious.

Design it simple

Mechanism design must be simple, accessible and repairable. Expensive forgings and castings should not only have provisions for rebushing but also have sufficient strength to install the next larger size bushing. Each mechanism should undergo a thorough testing program before final approval of design is given.

A basic problem of communication confronts the operator and manufacturer in their search for a reliable airframe structure. There is need for an organized information channel between the two. The first step in such a program would be the joint presentation by the operators to the manufacturers of preliminary design and testing specifications including written, oral and visual presentations.

Aircraft manufacturers as a group should make a thorough study of practical airline operations from remote field stations to main overhaul bases. Past failures to gain successful airframes should, of course, be de-emphasized in the co-ordinated reorganization that would eventually benefit both parties. Perhaps Churchill best stated the attitude which should prevail during deliberations between operator and manufacturer: "If we open a quarrel between the past and the present, we shall find that we have lost the future."

Accessibility Is Weak

By J. F. ROCHE

Manager, Aircraft Engineering, TWA

One common denominator of all system and component installations is accessibility—accessibility for repair, inspection, and/or replacement of component parts. However, no one feature—so sorely needed when we are pressed to make a unit replacement at time of scheduled departure—has been so grossly neglected in "modern" design.

Accessibility, as a design feature, is not one that will be covered at any length, if at all, by the usual textbooks. Mostly it is a matter of applying a

Continued on page 94

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Continued from page 92



ROCHE

little "horse-sense"—a matter of the design engineer making an honest factual appraisal of the problems of replacing any of the components in the system, and making sure that the design provides for all reasonable situations.

Unfortunately, it is not too evident that this is always done or today we would not be faced with the necessity of removing engines in order to replace components that we have always known have an unpredictable and usually all-too-short service life, or with many other situations that exhibit a similar lack of forethought in the design planning area.

Plenty of evidence

Examples of poor accessibility are not too difficult to find. We have entrance doors which require extensive removal of trim and lining in order to gain normal access to locking mechanisms; galley water lines which are buried and take considerable time to replace if frozen. Consider, too, that a typical day's operation for a single carrier will produce 25 or so instances where schedule delays occur due to aircraft mechanical malfunctions where access must be gained for adjustment, repair or replacement. At least several cases will involve situations where a large amount of time is required simply to gain access while only a relatively few minutes are required for the adjustment or replacement.

To improve this situation I believe that the design engineer must be more sensitive to the fact that mechanical parts will fail. He should, for the moment, forget his natural enthusiastic optimism for the degree of reliability which he is convinced he has incorporated into his design—and see that it is

possible for the necessary corrections to be made quickly while exposed to the working conditions and weather environment which may prevail at any time.

Cold, snow, rain and knuckle-bruising clearances are not conducive to fast replacement.

Remember, when we design for accessibility, we design to preserve on-time performance, schedule reliability and profit.

Don't Assume Success

By F. S. NOWLAND

Manager of Performance & Operations Analysis,
United Air Lines

From my experience it seems that there is too great a tendency to pre-judge the success of corrective action. By assuming that some new solution will solve our problems, and then failing to monitor closely the effect of change, we retard development of the state of the art and put off attainment of a satisfactory reliability level.



NOWLAND

Always, whenever a new airplane enters commercial service, many unanticipated problems with systems and components are experienced. They result in trip delays and cancellations, added costs of repair and overhaul, and higher investments in spares. There is great advantage to be gained, both from the economic as well as the public relations standpoint, by effecting corrections promptly and attaining the desired reliability without delay.

We realize that a number of factors besides equipment design and manufacturing processes enter into the reliability picture. Overhaul procedures and periodicity, operating specifications and practices, test and inspection methods, hardware design and modi-

fication—all of these play major roles. They are so inter-related that a change in one may cause unsuspected effects on the others. My point is that all the factors must be considered when we are trying to correct a deficiency so that we avoid creating further problems.

A step forward in the state of the art doesn't necessarily insure improved reliability. It comes usually from refinements generated by thorough analysis of problems that develop and constant study of the operating environment. I feel that vendors must be more active in this phase of our business.

Safety-Good, Comfort ? ? ?

By J. N. BARRACK

Supervisor, Aircraft Engineering Systems, TWA

An air traveler looks at an airplane from this view: "Is this a safe aircraft, is it comfortable and what will the trip cost?"

Safety, obviously, involves reliability of systems; reliability is achieved by good design and redundancy in critical areas. It is, however, important that simplicity be retained without sacrificing essential safety since weight involves payload and, ultimately, cost to the passenger. Generally speaking, the safety features designed into today's aircraft are excellent.

Let us, therefore, dwell on comfort. There have been definite shortcomings in the air conditioning, pressurization and water systems on present aircraft. The deficiencies fall both in the areas of system design and hardware reliability. Some outstanding examples in the air conditioning system are:

- (1) Improper tuning of the automatic temperature controls to the aircraft system response rate;
- (2) Lack of zone temperature control, especially in mixed configuration aircraft;
- (3) Inadequate cooling system capacity at low level, low speed flight;
- (4) Lack of adequate circuit and electric motor protection hardware;
- (5) Excessive cabin noise levels; and
- (6) Inadequate galley exhaust.

Bleed air problems

Likewise, in pressurization systems, the design of valves and regulators operating in a bleed air environment has produced poor reliability due basically to the accelerated contamination rate caused by high environmental temperatures as well as rapid deterioration of internal unit seals by high temperatures. The old problem of pressurization surges when bringing in or cutting out a turbocompressor or when



BARRACK

changing throttle settings is still present. Contamination of pressurization outflow valves by nicotine, etc., is another old problem that today is being endured only by periodic short term removal and cleaning of the units.

Similar examples exist in the aircraft water system and have been characterized by excessive leakage from: (1) the use of plastic lines in hot water systems; (2) water lines pulling loose

from fittings; (3) plastic water lines sagging from insufficient support, producing water traps; and (4) an excessive number of hot water heater overheat occurrences.

Water system leakage has a double effect in that the forward galleys are usually located over electrical and electronic equipment sections and water leaking down into this area has produced numerous inflight electrical and electronic malfunctions.

In summary, there is considerable room for improvement in the "comfort" systems. We believe that it would be to everybody's advantage if commercial carrier experience could be thoroughly researched in the design of such systems for new aircraft.

Reliability in Electronics

By B. M. MEADOR

Director-Electronics & Communications Engineering, TWA

Much has already been said about the need for reliability in electronic equipment. Yet, it continues to be one of the most serious problems facing an airline to date. This is true of other systems but seems even more applicable in the field of electronics, largely because of the increases in complexity and utility.

SILICONE NEWS from Dow Corning



Photo courtesy Fairchild Engine & Airplane Corporation

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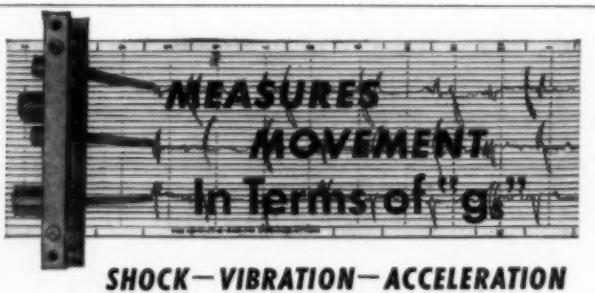
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To visualize the relationship of these factors to reliability, one can consider the terms reliability, complexity and utility to occupy each side of a triangle, the area of which is determined by state of the art.

This can be shown by reducing one

side to zero or unity. For example, the least complex item, or solid homogeneous sphere has a great deal of utility with high reliability. Or, a complex machine to do nothing does it quite reliably.

In this respect, utility is taken to

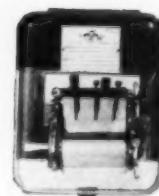


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cover the composite factors including what functions the system must perform; what percentage of the time is its output being used; etc. Complexity, in turn, covers the composite factors including: how many component parts are involved; how non-linear are the responses; how interrelated are the functions of various sections; etc.

Three points to consider

Reliability itself is a composite term in this relationship. It can be divided into three basic factors: accuracy of responses, including duplicability; service life, including predictability of impending malfunction or end of useful life; and maintainability, including ability to quickly test, trouble-shoot and replace defective or deteriorated components or to make satisfactory adjustments.



MEADOR

In many of our electronic systems in jet aircraft components fail or fall beyond tolerances at an excessive rate. The detection, correction or replacement of the defective or deteriorated component requires excessive time. With \$6 million aircraft a cancelled flight or even a few minutes delay can be a most expensive proposition. Providing spare aircraft to protect against such events likewise is an extremely expensive step for any airline to consider.

State of the art lags

Much of this has resulted from the state of the art not keeping step with increasing demands for more complex systems and for greater utility of them. Reliability has suffered. Savings in weight and space through advances in miniaturization have been used up in the addition of still more systems

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without due consideration for the need for increased reliability.

In particular, means are needed in future transport aircraft and their electronic systems for accurately and very quickly determining that adequate service life (within operating tolerances) remains. If not, or if the system has already failed, these means must identify the offending unit to permit very rapid correction.

Better Communications

By HARRY N. TAYLOR

Manager of Power Plant Engineering,
United Air Lines

One of our biggest problems is communicating technical information through the manufacturer's service department. When the airlines place new equipment into service, they build up experience so fast that they rapidly surpass all previous experience levels.



TAYLOR

If design improvements are to be incorporated quickly, there must be more direct contact between the designing engineer and the operator's technical people. Transmittal of this kind of information is looked upon as a function of the manufacturer's service department, and probably rightly so. The trouble is that many service departments act as filtering organizations, adjusting the reported facts according to their own viewpoint.

Try, for example, to transmit an involved technical problem under these circumstances. By the time our thinking on some complicated operating problem has gone through this series of service department filters, it no longer represents precisely what we had in mind. As a result, badly needed design improvements can be delayed, resulting in an economic loss to the operator and impairment of the service which he is trying to provide. ■

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NEWS IN BRIEF

EQUIPMENT

Melbourne, Australia—Trans-Australia Airlines is weighing the de Havilland Trident and Boeing 727 as contenders for a medium-range jet it would introduce in 1964-65. Both are three-engine models.

Cargo conversion—Ransa Airlines is converting a Boeing Stratocruiser for all-cargo operations between the U.S., the Caribbean and Venezuela. First flight of the modified plane is slated for October 5, and the airline expects to put the plane into scheduled service by the middle of October.

When ready for service, the plane will have a payload capacity of 40,000 pounds, or better than 6,000 cubic feet. Maximum range with a full load is 2100 miles. Cruise speed is 260 mph. Principal change in the plane will be new cargo doors measuring 80 inches by 78 inches. No beefing up of the floor was necessary since the Stratocruiser can accommodate densities up to 200 pounds per square inch.

Exact direct operating costs are not yet available but a Ransa official estimated that DOC would be as low or lower than any converted plane flying cargo today.

The Hague—KLM is displaying a strong interest in the Caravelle 10A, but no decision is likely before December. A KLM Convair 990 order, considered highly probable a few months ago, now seems unlikely.

Paris—Continuing Caravelle orders have boosted the twin-jet's share of total Sud Aviation business to about 70%. Present indications are that the Caravelle will remain in production at least through 1964. The French government recently authorized building of an additional 25 planes (to 175) and approval of another 25 is expected.

Accra, Ghana—The Boeing Co. and government of Ghana have agreed to terminate a sales agreement under which Ghana would buy two 707-420s. Lack of timely financing to meet early delivery dates caused the cancellation.

London—British Ministry of Aviation has ordered five Vickers VC-10 jets for the Royal Air Force for 1965 delivery. The \$28 million order increases British Aircraft Corp.'s VC-10 backlog to 57 aircraft. (See Farnborough report, this issue).

Tokyo—First prototype of Japan's YS-11 twin Dart powered turboprop transport is scheduled for flight in early 1962. Japanese government has authorized \$5 million in loans to finance its construction by Nihon Manufacturing Co.

U.S.—North American Aviation's first bid for a share of future jet transport markets involves a proposed 72-passenger, four-jet model grossing 72,000 lbs. and priced at about \$2.75 million. Powerplants would be either GE CF-700s or P&W JT12s, aft-mounted. In mixed-class layout it would carry 59 passengers, 14 first-class and 45 tourist. Wings would have 30-degree sweep, same as the DC-8.



TWA CARAVELLE, as viewed by artist, will be delivered early in 1963. TWA has ordered 20, optioned 15 with GE engines. (See Industry At A Glance, p. 13).

However, NAA has closed down its commercial aircraft marketing group headed by R. James Pfeiffer, a hint that its jet transport interest is purely exploratory.

Cairo—United Arab Airlines is reportedly considering a British Aircraft Corp. proposal of \$45 million in credit over 12 years against purchase of VC-10 jets. A proportion of repayment would be

accepted in goods, particularly Egyptian cotton.

Conversion—Aviation Traders (Engineering) Ltd. will convert three more DC-4s to its nose-loading Carvair carrier design for Channel Air Bridge.

Nairobi, East Africa—East African Airways Corp. has ordered three Fokker F-27s for delivery in late 1962. It brings



BACK DOOR OF C-141, new U.S. civil-military cargo jet being developed for MATS by Lockheed Georgia Division, is exhibited in photo of full-scale mock-up. Note how bottom fuselage panels at tail tuck into side panels so that vertical rear door may be dropped to serve as loading platform.

Fokker/Fairchild F-27 total to 191 aircraft and 66 individual operators.

King's Comet—King Ibn Saud of Saudi Arabia has ordered a de Havilland Comet 4C for delivery in early 1962. It will be operated by Saudi Arabian Airlines but for the king's personal use.

MANAGEMENT

BAC Shift—Sir George Edwards takes over the new post of managing director of British Aircraft Corp. He has been an executive director along with Viscount Caldecote, who becomes deputy managing director and chief executive of guided weapons. Sir George relinquishes his post as managing director of Vickers-Armstrongs (Aircraft) Ltd. and becomes deputy chairman of that company.

Change at Lockheed—Courtland S. Gross, president of Lockheed Aircraft Corp. for the past five years, becomes board chairman. He succeeds his brother, Robert E. Gross, who died of cancer Sept. 3. Daniel Haughton, former executive vice president, is the new president.

Front office—Douglas A. Patterson moves from asst. general manager to GM of New Zealand National Airways Corp. succeeding Capt. J. J. Busch who died in August.

Merger complacency?—Supposedly merger conscious airline industry was conspicuous by its absence from recent Northwestern Univ. symposium on mergers. Only three carriers participated—American sent a top v.p., Riddle a presidential assistant and United's W. A. Patterson was a panel member. In contrast, the president of virtually every major railroad was in attendance, in person.

Merger activity—Stockholders of Alaska Coastal Airlines and Ellis Air Lines have endorsed a merger plan which is now in the hands of U.S. Civil Aeronautics Board for approval. Resulting carrier will be named Alaska Coastal-Ellis Air Lines with Sheldon B. Simmons of ACA as president and Robert E. Ellis as v.p.-sales.

Merger of Iranian Airways and Persian Air Services is slated to take place on November 2.

LABOR

Strike against progress—TWA's conditional approval from FAA to navigate its fleet of jets over the North Atlantic using Bendix Doppler navaiads in lieu of a flight navigator in the crew brought the threat of strike action. TWA's navigators are represented by the air transport division, Transport Workers Union.

AIRPORTS

Sydney, Australia—Australian government will spend \$6.75 million over next four years to extend Sydney Airport's 550 ft. N-S runway to 7500 ft. jet standard. It also plans to have Perth Airport ready for jets by mid-1962, giving Australia five jet airports—Sydney, Perth,

Brisbane, Darwin and Melbourne. Latter is limited to Comets, however.

Washington, D.C.—U.S. capital's Washington National Airport may get new consideration for jet operations under a switch in FAA policy stating that opening of Dulles International is not a prerequisite to jets at WNA. FAA is experimenting with smaller jets such as Caravelle and Lockheed JetStar and hopes to test Boeing 720B.

One U.S. airline, reportedly United, is pushing for a parallel runway at WNA to eliminate the horrendous ground and air delays which have become a daily diet at the U.S. capital's ill-planned and now obsolescent airport.

Chicago—American Airlines has notified city officials it is planning to shift its entire operation to O'Hare International

Airport within the next 60 to 90 days. The AA move will further intensify a "ghost airport" atmosphere fast developing at Chicago's Midway Airport as the result of a ban imposed on jet operations there.

ATC

New comm system—Motorola and General Precision, Inc. have proposed to FAA a new air-ground communications system called ACCESS (for Aircraft Comm Electronic Signalling System) which would employ time-sharing to cut in half the voice communications required on an average flight. It would use present equipment without modification, would fill the bill for all airspace users and would enable each user to tailor his equipment to his needs, according to its proponents.

Apollo computer—New British air traf-



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fic control computer developed by Ferranti Ltd. is about to undergo experimental evaluation by the Ministry of Aviation at Prestwick's Scottish ATC center for transatlantic traffic services. It will handle standard ATC data and will be used alongside manual ATC procedures to determine the optimum division of ATC functions and to investigate development of new ATC procedures based on automatic handling of data.

A second ATC computer (digital) is under development for the Ministry of Aviation by Elliot Brothers (London) Ltd.

Automatic landing—Britain's Blind Landing Experimental Unit (BLEU) has now registered more than 8000 landings including a few using leader beacons to replace the underground leader cables

which pose such an economic and engineering obstacle to possible adoption of the system at many airports of the world.

FAA

Certifications—Fairchild has received FAA certification of the F-27F, a 39,400 lb. gross version with transcontinental nonstop capability for executive operations. Testing of F-27G incorporating fuel dump chutes to permit 42,000 lb. takeoff gross is almost completed.

New TSO—FAA has adopted TSO-C52A covering flight directors effective September 15. It is proposing another TSO dealing with airborne static electrical power inverters.

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'Copter engine—GE's CT58-110-1, turbine powerplant for both the Vertol 707 and Sikorsky S-61, has been certified by FAA at 1250 shp.

CRAF

Latest lineup—Defense Air Transportation Administration has issued a revised lineup of U.S. airline aircraft allocated to the Civil Reserve Air Fleet (CRAF) effective August 15. It includes 226 aircraft, 92 for the Atlantic and 134 for the Pacific as follows:

Axicco—7 DC-6As; Alaska—1 DC-6A; Braniff—1 DC-6A; California Hawaiian—1 DC-4; Capitol Airways—1 1049H; Flying Tigers—12 1049H, 2 CL-44s; Great Lakes—3 DC-6As; National—4 1049Hs; Northwest—5 DC-6As, 5 DC-8s; Overseas National—1 CL-44; Pan Am—15 DC-4s, 10 DC-7CFs, 25 707-300s, 19 DC-8s; Riddle—10 DC-7CFs; Seaboard World—8 1049Hs, 2 CL-44s; Slick—5 1049Hs, 1 DC-4; Southern Air Transport—3 DC-6As; Trans Caribbean—1 DC-6A; Trans International—4 1049Hs; TWA—4 1049Hs, 12 1649As, 12 707-300s; United—7 DC-6As, 6 DC-7Bs, 12 DC-8s; U.S. Overseas—10 DC-4s, 2 DC-6As; and World Airways—3 DC-4s, 7 DC-6As and 5 1049Hs.

Contingency allotments go to Northwest—9 DC-7Cs; Pan Am—6 707-100 and 13 DC-7Cs; TWA—14 1649As and United—2 DC-8s. American Airlines does not appear on the current CRAF roster.

NEW BUSINESS

Temco Overhaul and Aerostystems Division, Greenville, Tex., will progressively overhaul 30 U.S. Air Force Douglas C-133As at 1200 hr. intervals under a \$1.4 million USAF contract.

General Precision, Inc., GPL division, Pleasantville, N.Y., has a \$285,000 USAF contract to research and develop a nuclear gyroscope employing the nucleus of the atom as a reference.

Aeronautical Radio, Inc.'s air-ground communications activities are being expanded about 25% as the result of a decision by **American Airlines** to shift from a company-staffed system to Arinc. Changeover will be made between October 14 and April, 1962. Three of the "Big Four" carriers now use the Arinc system, United and TWA having adopted it earlier.

Airwork Corp., Millville, N.J., has been named distributor for **Jack & Heintz**, the first ever to be designated by the Cleveland aircraft electrical accessory builder. Airwork also has been designated by **Cunard Eagle Airways** to overhaul the Dart engines on its Viscounts.

Burma Airways has contracted with **Pakistan International Airways** for major overhaul of its Viscounts to be conducted at PIA's Karachi base.

Dallas Airmotive will overhaul P&W R2800 engines on **Southern Airways** newly acquired Martin 404s under a contract exceeding \$1 million.

MISCELLANY

Anti-collision success?—Aeroflot, Russia's state airline, reportedly is using dual airborne radar with the second unit employed for collision avoidance. Forward coverage is 120 deg. horizontally (60 deg. to left and right) and 60 deg. vertically.

(30 deg. up and down), according to ALPA president C. N. Sayen who viewed it on a recent visit to USSR. System is understood to be tied into autopilot for automatic evasion.

Break for locals—California's Rep. Arthur Younger has proposed that subsidized local airlines be given preferential treatment in future MATS airlift contracts which parallel their routes.

Advertising drive—TWA is running an 8-page European travel tour guide insert coupled with a 2-page ad in two major U.S. magazines as part of a \$250,000 program to spur off-season tourism to Europe and bolster next spring's transatlantic market potential.

Accounting shift—Eastern Air Lines is transferring its general accounting offices from New York to Miami where the majority of its accounting operations are located. Insurance, tax and cash accounting groups will remain in New York reporting to the corporate treasurer/secretary.

Cargo meeting—IATA has set April 30, 1962 as the date and Lucerne, Switzerland as the place for a special symposium on air cargo, all cargo aircraft and integrated cargo loading systems.

Conference on supersonics—FAA has confirmed Dec. 5-6 as the schedule for a conference on airworthiness of supersonic transports to be held in Washington, D.C.

Another pool—SAS and Finnair have signed an agreement covering pooling of operations within Scandinavia effective Nov. 1. The carriers also signed a technical cooperation pact.

Honors—British European Airways' Canadian-born chief engineer Beverley S. Shenstone is president-elect of the Royal Aeronautical Society. BEA's medical director, Dr. A. Buchanan Barbour, both a doctor and engineer, has been named president of the Airline Medical Directors Assn. (U.S.), the first time this honor has gone to an official of an airline not operating to or in the states.

Sen. A. S. "Mike" Monroney (D-Oklahoma) has been named to receive the 1961 Wright Memorial Trophy.

Helicopters—Surprise proposal in Washington, D.C. helicopter case is Allegheny Airlines' bid to use Sikorsky S-58s to be bought from Chicago Helicopter Airways when latter receives its new turbine S-61s.

TWA has signed joint fare agreement with San Francisco & Oakland Helicopter Airlines effective Sept. 24 cutting helicopter fare for TWA passengers to about half the regular fee. The agreement has been opposed strongly by United Air Lines.

DC-8 SST—Douglas Aircraft put in its claim for the DC-8 as the first commercial transport to go supersonic after it recorded a true airspeed of 660-plus at 40,350 ft. in a dive while testing a wing leading edge extension on a flight from Long Beach to Edwards AFB.

Diversification—Allegheny Airlines has set up a new company, Allegheny Services Corp., in which it proposes to center its varied diversification programs while keeping its airline activities under the present company. CAB approval of control relationship of its officers and directors is being sought.

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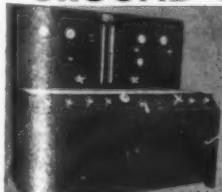
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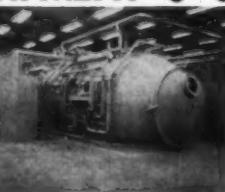
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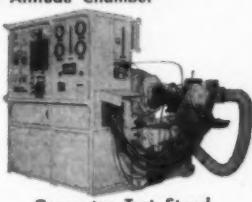
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ADVERTISERS' INDEX

Aeroquip Corporation	93	Gledhill Road Machinery Co.	88
Agency—The Fred M. Randall Company		Agency—Chapel and Assoc.	
Aerotec Industries, Inc., Aerotherm Div.	26	The Globe Company	58
Agency—Doremus-Eshleman Co.		Agency—Ross Llewellyn Inc.	
Aero-Test Equipment Company	101	Goodyear Tire & Rubber Co., (Aviation Products)	14, 15
Agency—Creative Visuals of Dallas, Inc.		Agency—Kudner Agency, Inc.	
Aircraft Equipment Company	101	Hawker Siddeley Aviation	8
AiResearch Mfg. Co., The Garrett Corp.	34	C. G. Hokanson, Co., Inc.	99
Agency—J. Walter Thompson Co.		Agency—The Essig Co.	
Alaska Airlines, Inc.	92	The Frank G. Hough Co., (Sub. of Int'l Harvester Co.)	85
Agency—Burke & Thomas, Inc.		Agency—Ervin R. Abramson Adv., Inc.	
Allied Chemical Corp.	63	Horton-Horton	3
Agency—Benton & Bowles, Inc.		Agency—McGuirk & McCarty	
American Airlines, Inc.	73	Impact-O-Graph Corp., The	96
Agency—Doyle, Dane, Bernbach, Inc.		Agency—The Hubbell Adv. Agency	
American Machine & Foundry Co., Government Products Group	35	Industrial Credit Co.	97
Agency—Cunningham & Walsh, Inc.		Agency—E. T. Holmgren, Inc.	
Astek Instrument Corp.	97	Irrigation Equipment Co., IRECO Industrial Div.	50
Agency—Pike & Becker Inc.		Agency—Heims & Turtledove, Inc.	
Bendix Corp., The, Bendix Radio-Avionics	70	Major Tool & Machine, Inc.	96
Agency—MacManus, John & Adams, Inc.		Motor Generator Corp.	90
Bendix Corp., The, Scintilla Div.	51	Agency—Ralph Dalton & Assoc.	
Agency—MacManus, John & Adams, Inc.		George L. Nankervis Co.	94
Bil-Jax, Inc.	97	Agency—St. Claire Adv.	
Agency—Chamberlain-Junk Adv. Inc.		On Mark Couplings, Inc.	89
Boeing Company, The	4	Agency—Cole Fischer Rogow, Inc.	
Agency—Fletcher Richards, Calkins & Holden, Inc.		Phillips Petroleum Co.	54
Braniff Int'l Airways	74	Agency—Lambert & Feasley	
Agency—Cunningham & Walsh, Inc.		P.I. Steel Corp.	78
British Aircraft Corp.	21, 22, 23, 24	Agency—Diesen & Assoc.	
Agency—McCann-Erickson Adv.		Portland Cement Assoc.	38, 39
British European Airways	52, 53	Agency—J. Walter Thompson Co.	
Agency—Gaynor & Ducas, Inc.		Pratt & Whitney Aircraft Div., United Aircraft Corp.	66, 67, 105
Canadian Marconi Co.	106	Agency—Campbell-Ewald Co.	
Agency—Ronald Reynolds & Co.		Rolls-Royce, Ltd.	79
Central Airlines, Inc.	86	Agency—The Wesley Associates, Inc.	
Chamberlain Aviation Inc.	100	Sikorsky Aircraft Div., United Aircraft Corp.	83
Agency—Ralph Gross Adv., Inc.		Agency—Campbell-Ewald Co.	
Curtiss-Wright Corp., Caldwell Wright Div.	77	Sundstrand Aviation Div., Sundstrand Corp.	12
Agency—Hayden Adv. Inc.		Agency—Howard H. Monk & Assoc.	
Delta Air Lines, Inc.	55	Texaco, Inc.	10
Agency—Burke Dowling Adams, Inc.		Agency—G. M. Basford Co.	
Douglas Aircraft Co., Inc.	43	Trans World Airlines, Inc.	28
Agency—J. Walter Thompson Co.		Agency—Foote, Cone & Belding	
Dow Corning Corp.	95	Warner Lewis Co.	2
Agency—Church & Guisewite Adv. Inc.		Agency—Paul Locke Advertising, Inc.	
Fairchild Stratos Corp., Aircraft & Missiles Div.	30, 31	Western Air Lines, Inc.	6
Agency—Duncan-Brooks, Inc.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
Frazier Aviation Services, Inc.	87	Westinghouse Electric Corp., Defense Products Group	59
Agency—Michael Brand		Agency—Batten, Barton, Durstine & Osborn, Inc.	
General Electric Co., Flight Propulsion Div.	46, 47		
Agency—George R. Nelson, Inc.			

EAL Again Leads Trunks In On-Time Rating

For the second successive month, Eastern Air Lines topped the list of trunks in "on time" performance in June with a remarkable 86.1% of nonstops and one-stops arriving within 15 minutes of schedule. It also ranked tops in "big jet" operations and in Electra turboprop operations. West Coast led the locals with a 93.2% on-time record. Piedmont also exceeded 90% with a June record of 91.1% on time.

ON-TIME BOXSCORE

JUNE, 1961			
Airline Ranking	Total Trips	On time to 15 min. late	
TRUNKS			
1 Eastern	4541	86.1%	
2 Braniff	1207	81.6	
3 TWA	3208	80.1	
4 United	4879	76.2	
5 American	6284	73.9	
6 National	750	73.6	
7 Continental	1557	67.6	
8 Northeast	2595	65.9	
9 Capital (United)	2503	64.6	
10 Delta	1959	64.0	
11 Western	1187	60.9	
12 Northwest	No Report as of 9/15/61		
707 & DC-8			
1 Eastern	474	82.0%	
2 TWA	1147	78.2	
3 Braniff	262	70.9	
4 National	290	66.5	
5 American	1186	62.5	
6 Continental	523	60.4	
7 United	1450	59.3	
8 Delta	452	50.6	
9 Western	114	45.6	
10 Northwest	No Report		
720			
1 United	687	65.6%	
2 American	831	49.6	
3 Capital (United)	174	35.6	
4 Western	58	29.3	
880			
1 TWA	676	69.8%	
2 Delta	420	56.6	
3 Northeast	450	48.0	
ELECTRA			
1 Eastern	445	80.8%	
2 American	1378	79.5	
3 Braniff	164	69.5	
4 Western	480	60.6	
5 National	83	53.0	
6 Northwest	No Report		
LOCAL SERVICE			
1 West Coast	238	93.2%	
2 Piedmont	34	91.1	
3 Frontier	500	88.6	
4 Southern	359	88.5	
5 Ozark	489	86.7	
6 Pacific	64	85.9	
7 Allegheny	702	78.6	
8 North Central	1118	77.1	
9 Bonanza	432	76.6	
10 Central	268	75.0	
11 Lake Central	474	73.2	
12 Mohawk	698	67.3	
13 Trans-Texas	No Report as of 9/15/61		

SOURCE: AIRLIFT Research.

Note: Nonstop and one-stop flights only.

Late CAB Filings Delay 'On Time' Reports

The inability of a number of trunk airlines to file their "on time" reports within the 45 days allowed by CAB is hampering *AIRLIFT'S* program to bring these vital statistics to the attention of industry at the earliest date possible. For July, in which Eastern led the industry at 87% on time, four trunks were late filing. All locals filed on time.

ON-TIME BOXSCORE

JULY, 1961

Airline Ranking	Total Trips	On time to 15 min. late
TRUNKS		
1 Eastern	4792	87.0%
2 Braniff	1142	85.5
3 Continental	1716	79.3
4 American	5972	77.3
5 Delta	2077	72.0
6 Western	1210	69.9
7 Northeast	2947	66.2
8 National	No Report as of 9/15/61	
9 Northwest	No Report as of 9/15/61	
10 TWA	No Report as of 9/15/61	
11 United	No Report as of 9/15/61	
707 & DC-8		
1 Braniff	284	78.8%
2 Eastern	610	77.2
3 Continental	561	69.6
4 American	1186	64.8
5 Delta	484	56.6
6 Western	239	36.4
7 National	No Report	
8 Northwest	No Report	
9 TWA	No Report	
10 United	No Report	
720		
1 American	772	77.2%
2 Western	235	49.7
3 Northwest	No Report	
4 United	No Report	
880		
1 Delta	407	67.5%
2 Northeast	487	49.4
3 TWA	No Report	
CARAVELLE United	No Report	
ELECTRA		
1 Western	518	86.4%
2 Eastern	757	85.2
3 American	1341	81.9
4 Braniff	156	75.0
5 National	No Report	
6 Northwest	No Report	
LOCAL SERVICE		
1 West Coast	239	99.5%
2 Piedmont	34	97.0
3 Southern	392	94.6
4 Frontier	486	92.1
5 Pacific	68	88.2
6 Ozark	575	88.0
7 Trans-Texas	379	87.5
8 Bonanza	445	87.1
9 Allegheny	680	82.7
10 Lake Central	476	81.9
11 North Central	1240	80.7
12 Central	196	79.5
13 Mohawk	535	67.8

SOURCE: AIRLIFT Research.
Note: Nonstop and one-stop flights only.

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Rambling Around South Africa, Close Calls And A Close Shave



Surf on Indian Ocean coast at Wilderness east of Capetown, South Africa.

Photos by W.W.P.

South African Airways is a well-operated airline by the South African Railways, which in turn is owned and operated by the Union of South Africa.

One would think that being under the thumb of both the railroad and government, the airline would be quite subservient. Of course, it is, technically, but in actual practice the airline has been given quite a bit of freedom and it does compete with the government railways.

I'm sure that some of this independence is due to the smooth direction of J. M. Grove (pronounced Groovy), chief executive officer, with whom I spent some time in Johannesburg.

For example, South African Airways began skycoach service several years ago. To some extent the reduced fares drew traffic away from the first class services, but in the main they have brought new business to the air—away from the railroads. DC-4s have been used principally for the coach service and business has steadily increased.

SAA also began a coach service for non-whites at two-thirds the standard fare, but business hasn't lived up to expectations. For one thing, the non-whites don't travel so much in the Union. Lower standard of living may also account for the lack of traffic.

A 120-foot-long bar

SAA uses Viscounts chiefly within the Union and to neighboring countries. It also has a DC-7B or two, plus the DC-4s, and on the intercontinental routes it has 707s but has had some rather bad luck with these due to operational difficulties at airports en route to London.

I should mention in passing that Mr. Grove took me to lunch at the Wanderers Club which has a fine setting but the most remarkable feature of which, I discovered, is a bar 120 feet long.

I hope Mr. Grove won't mind my reporting on my Capetown-Johannesburg flight inasmuch as I have already said my piece about the southbound breakfast flight. The return was on a dinner flight, Viscount, with one stop at Bloemfontein. There was the usual abundant cabin crew—two stewards and a stewardess—which is really something to come by in a Viscount.

It was one and three-fourths hours to Bloemfontein for arrival there at 6:40 p.m. During this portion only drinks were served. After a 35-minute stop, and with only 50 minutes to go to Johannesburg, the cabin crew attempted to serve a deluxe dinner and also, much to my surprise, to keep on serving drinks to those who wanted them.

There was a salad/fish course; a meat course; dessert (on the tray); then cheese and crackers. Then a basket of fruit was passed around, but no time was left for coffee. I hope Mr. Grove will pardon me for commenting somewhat unfavorably on waste motion and poor timing. Bounce at least one of the cabin crew, serve a simple meal all on one tray, save money, stop the confusion and chaos, and SAA will get a better mark from passengers.

SAA has reserved seats, a good idea, but I noticed that the numbers on the seats are very poorly marked and passengers were all mixed up and back-tracking. A lot of confusion could be avoided quite simply by plain marking of seat numbers.

French, the menu language

Countries with two languages have problems. Those of you who have traveled much in Belgium are aware that Flemish and French are used on road signs and just about everywhere. French Canada is another example. In South Africa it is quite mandatory that both English and Afrikaans be used, and the latter is really a tough language to absorb. (So to further confuse things, most restaurant menus are in French, even in small towns.)

But there is another problem in the Union. It has two capitals. The main capital is Pretoria, not far north of Johannesburg, but Parliament also meets in Cape Town for half its session. This means that the government has to move many of its people about 900 miles. It means also that all foreign governments with diplomatic relations have to have accommodations in two cities.

The U.S. has its embassy in Pretoria but also owns five houses in Capetown for the annual trek with Parliament. It's very costly and very cumbersome but you've heard of Fort Worth and Dallas, and some sort of the same pride is evident in the Union.

African lobster tails are considered to be a great delicacy in the U.S. and appear on many restaurant menus. Well, they come from the Capetown area and are canned and frozen and mostly shipped to the U.S. Know what these lobster tails are? Just plain old crayfish, but tasty. And know something else? It's next to impossible to get any in South Africa. They're not even too highly regarded down there.

Capetown needs some hotels, that is, providing the tourist business doesn't collapse completely. The Grand is fine, although small, but it is at the busiest intersection of the city and hence is noisy and

also difficult to drive to without getting a ticket. And the hotels out along Sea Point aren't very good for tourists from Europe and the U.S. They are somewhat staid and old-fashioned for the locals and meal time is awfully depressing, with that mass production system of serving everyone at once, and the noise is pretty bad. Instead of serving the meal on plates, everything has to be transferred by the waiter from serving trays to plates and when this is going on all over the dining room it just ain't very relaxing. Also, the system is a waste of time and motion.

Backroom barbershop

But I found two excellent hotels on the so-called (and over-rated) Garden Route along the coast east of Capetown. The Beacon Hotel at Plettenberg Bay is on an islet. Scenic and fine. Also first class is the Wilderness Hotel at Wilderness with an exceptionally beautiful beach, bright and cheery dining room, leisurely atmosphere, good service, and good bedrooms.

It should be noted that one thing I enjoy is getting haircuts in overseas spots. So I was recommended to the Castle Hairdressing Saloon in the rear of a tobacco shop in Capetown and experimented with a spirit shampoo which turned out to be ammonia with a pretty heady odor. I asked for a short trim and I got one. The barber shaved the back of my head. I called it a Bantu special.

One delightful experience in South Africa was a visit to S.W.L. deVilliers, Under-Secretary of Transport at Pretoria. He sent his car for me and my wife at Johannesburg and had us returned there in style. A very intelligent man, deVilliers, and well known to many aviation folk in the U.S. After a long talk in his office we visited his attractive home and then attended a fancy governmental reception of some sort.

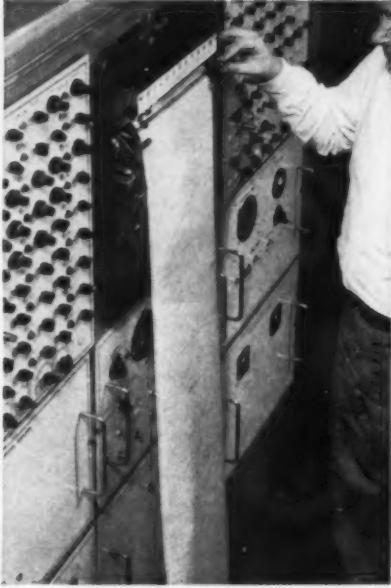
A couple of social notes: Instead of "Do Not Disturb" signs, the Queens Hotel at Capetown has "No Morning Tea" signs . . . A traffic light in South Africa is a "robot" . . . There is an active Society for the Prevention of Cruelty to Animals in Johannesburg, but one wonders why something isn't done about the large number of deformed street beggars . . . A glass of water is about the toughest of all things to obtain in a hotel or restaurant in South Africa . . ■



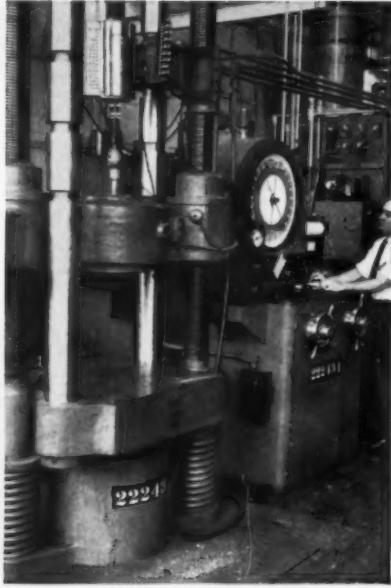
A young native of the Union of South Africa.



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